

Attorney Docket No. 65678-0042

#1 DAC
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of: Bly, et al.

Serial No.: 09/990,911

RECEIVED

Filed: November 14, 2001

SEP 04 2002

For: SYSTEM AND METHOD FOR DISPOSING OF ASSETS

OFFICE OF PETITIONS

CERTIFICATE OF MAILING

I hereby certify that the enclosed Supplemental Information Disclosure Statement is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Commissioner for Patents, BOX DAC, Attn: Nancy Johnson, Washington, D.C. 20231 on this 29th day of August, 2002.

Alisa M. Varela

Commissioner for Patents

BOX DAC

Attn: Nancy Johnson

Washington, D.C. 20231

RESPONSE TO DECISION REFUSING STATUS UNDER 37 CFR 1.47(a)

Dear Sir:

This response is sent pursuant to a decision refusing status under 37 CFR 1.47(a) and mailed May 31, 2002. The undersigned responds to the deficiencies noted with respect to the decision as follows:

I. Provide further details on the circumstances of the refusal

A. Brent Parent

Attached as Exhibit A is a package sent to Mr. Brent C. Parent on July 19, 2002. The package is a duplicate of one sent to him on November 16, 2001, including both the letter and the indicated attachments. The attachments comprise complete copies of U.S. patent applications for Dana reference numbers 5397 DCCSP (U.S. Application Serial No. 09/714,702) and 5672 DCCSP (U.S. Application Serial No. 09/990,911), and then currently executed versions of combined Declaration and Power of Attorney for each of the applications by other co-inventors

for the applications. Once again we tabbed where Mr. Parent was requested to sign his name as an inventor for each of the applications on the applicable Combined Declaration and Power of Attorney documents.

As set forth in the letter, we confirmed that Mr. Parent in fact received the package that sent on November 16, 2001. We further confirmed that he left the undersigned a voice mail on November 20, 2001, acknowledging receipt of the package and providing his cell phone number and home phone number. Moreover, the letter confirmed Mr. Parent received a carbon copy of a message Andy Suhy sent to the undersigned on November 26, 2001 concerning the similar package he received. (Exhibit B). The undersigned responded to both Mr. Parent and Mr. Suhy promptly after receiving the e-mail message. (Exhibit C)

The letter goes on to confirm that the undersigned had a telephone discussion within a day or so after the e-mail message was from Mr. Suhy and the undersigned responded. The discussion concerned the package provided to Mr. Parent on November 16, 2001, wherein he again refused to execute any documents associated with his former employer Dana Corporation despite his obligation to do so as an employee inventor at the time the inventions were developed. Moreover, it was discussed that if a joint inventor refuses to join in an application for patent or cannot be found or reached after due diligent effort, the application may be made by the other inventors on behalf of himself or herself and the non-signing inventor. A refusal to sign the Combined Declaration and Power of Attorney is such a refusal. As part of the discussion discussion, Mr. Parent agreed to pass on the clarification of the reasons associated with the need for signatures to Mr. Suhy since he was in contact with him.

As shown in Exhibit D, Mr. Parent received the package of Exhibit A, including the letter dated July 19, 2002. Mr. Parent has not contacted the undersigned in any manner. A final e-mail communication sent to Mr. Parent and Mr. Suhy concerning the need for their signatures on the requested documents is attached as Exhibit E. If a favorable response is received, an updated response will be promptly filed.

In view of the foregoing, it is respectfully submitted that every reasonable effort has been made to provide Mr. Parent with the required documents and to request his assistance in

executing the Combined Declaration and Power of Attorney documents. It is further submitted that by the letter sent to Mr. Parent as noted above, the undersigned has confirmed additional specifics of the various communications such as the dates on which they took place as well as confirmed that Mr. Parent was provided with all necessary documents on two separate occasions, including with the original package sent on November 16, 2001. His refusal to sign in accordance with 37 CFR 1.47(a) is well documented and complies with the requirements of the provision.

B. Andrew F. Suhy

Attached as Exhibit F is a package sent to Mr. Andrew F. Suhy, Jr. on July 19, 2002. The package is a duplicate of one sent to him on November 16, 2001, including both the letter and the indicated attachments. The attachments comprise complete copies of U.S. patent applications for Dana reference numbers 5397 DCCSP (U.S. Application Serial No. 09/714,702) and 5672 DCCSP (U.S. Application Serial No. 09/990,911), the currently executed versions of combined Declaration and Power of Attorney for each of the applications by other co-inventors for that application, and the Declaration and Power of Attorney Mr. Suhy originally executed for 5397 DCCSP. Once again we tabbed where Mr. Suhy needed to sign his name as an inventor for each of the applications on the applicable Combined Declaration and Power of Attorney document.

The letter confirmed that Mr. Suhy in fact received the package that was sent to him on November 16, 2001 at his Ohio address. As stated, the letter was not sent to the old New York Address since the package sent was returned for non-delivery and a confirmation written on the package that Mr. Suhy had moved.

The letter further confirmed that Mr. Suhy sent the undersigned an email on November 26, 2001, acknowledging receipt of the package. (Exhibit B). The undersigned responded to the e-mail promptly upon receipt. (Exhibit C). Further, in response to the email communication, the undersigned tried to contact Mr. Suhy on his mobile telephone using the phone number provided in the e-mail, but did not receive any return telephone calls. The letter also confirmed that the electronic mail communication was carbon copied Brent Parent.

Moreover, the letter confirmed that on November 20, 2001, Mr. Parent left the undersigned a message with both his cellular telephone number and his home number. Within a day or so after receiving the e-mail and responding, the undersigned spoke personally with Mr. Parent by phone concerning the legal obligations that both Mr. Suhy and he have to sign and return the Combined Declaration and Power of Attorney documents based on their employment with Dana Corporation at the time that the invention was developed by each of them as co-inventors for the indicated applications. As also explained to Mr. Parent, if a joint inventor refuses to join in an application for patent cannot be found or reached after diligent effort, the application may be made by the other co-inventors on behalf of himself or herself and the non-signing inventor. A refusal to sign the Combined Declaration and Power of Attorney is such a refusal.

Finally, the letter confirmed that discussions by the undersigned with Mr. Parent, he indicated that he would pass on the clarifications that we discussed of the reasons associated with the need for the signature of Mr. Suhy on the enclosed papers.

As shown in Exhibit G, Mr. Suhy received the package of Exhibit A, including the letter dated July 19, 2002. Mr. Suhy has not contacted the undersigned in any manner. A final e-mail communication sent to Mr. Parent and Mr. Suhy concerning the need for their signatures on the requested documents is attached as Exhibit E. If a favorable response is received, an updated response will be promptly filed.

In view of the foregoing, it is respectfully submitted that every reasonable effort has been made to provide Mr. Suhy with the required documents and to request his assistance in executing the Combined Declaration and Power of Attorney documents. It is further submitted that by the letter sent to Mr. Suhy as noted above, the undersigned has confirmed additional specifics of the various communications such as the dates on which they took place as well as confirmed that Mr. Suhy was provided with all necessary documents on two separate occasions, including with the original package sent on November 16, 2001. His refusal to sign in accordance with 37 CFR 1.47(a) is well documented and complies with the requirements of the provision.

II. Deficient Oath or Declaration

The Decision included a number of objections to the oath or declaration. A supplemental oath or declaration is enclosed as Exhibit H.

A. The declaration must include the citizenship of all inventors, regardless of signing status

Exhibit H includes the citizenship of non-signing inventors Suhy and Prent, as well as the insertion of citizenship by inventor Patrick O'Brien. Mr. O'Brien has initialed and dated the insertion. Thus, the inventorship of all inventors is now included.

B. Non-dated or initialized changes to Roth's residence information

Mr. Roth has dated and initialized the change he made to his address. Mr. O'Brien has also provided updated address information, which he has also dated and initialed.

C. Residence Address

It is confirmed that the residence address is both the address where the inventors live and where they originally receive mail, the mailing address.

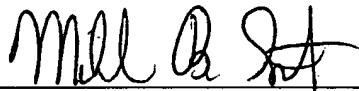
III. Conclusion

It is respectfully submitted that the deficiencies and objections to as noted in the Decision have been addressed. Therefore, granting of the petition is respectfully requested. A one month extension of time may be charged to Deposit Account No. 18-0013 in the name of Rader, Fishman & Grauer PLLC. If there are any deficiencies associated with the filing of this response, they may be charged to the same deposit account.

If there are any questions or comments, please contact the undersigned.

Finally, a copy of the Notice to File Missing Parts is enclosed with this Response.

Respectfully submitted,



Michael B. Stewart, Reg. No. 36,018

Attorney for Applicants

RADER, FISHMAN & GRAUER PLLC

39533 Woodward, Suite 140

Bloomfield Hills, MI 48304

Date: August 29, 2002

Customer No. 010291

Telephone No. (248) 594-0633

R0157678.DOC

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RADER,

FISHMAN

& GRAUER

PLLC

VIA FEDERAL EXPRESS

(Signature Release – Saturday Delivery)



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Michael B. Stewart

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EV064963449US

July 19, 2002

Brent C. Parent
247 Stone Oak Court
Holland, OH 43528

Ref: 65678-0042
Dept: *Parent*

Date: 19JUL02 SHIPPING \$10.67
Wgt: 1 LBS SPECIAL \$10.27
HANDLING \$0.00
TOTAL \$20.94

SERVICE: PRIORITY SATURDAY
TRACK: 4702 6397 6647

Re: U.S. Patent Application for APPARATUS AND METHOD FOR TRACKING
AND MANAGING PHYSICAL ASSETS
Dana Case 5397 DCCSP; Our Ref. 65678-0037

U.S. Continuation-in-Part Patent Application for SYSTEM AND METHOD FOR
DISPOSING OF ASSETS
Dana Case 5672 DCCSP; Our Ref. No. 65678-0042

Dear Brent:

Once again, we enclose a copy of the package that we sent to you on November 16, 2001, including both the letter and the indicated attachments. The attachments comprise complete copies of U.S. patent applications for Dana reference numbers 5397 DCCSP (U.S. Application Serial No. 09/714,702) and 5672 DCCSP (U.S. Application Serial No. 09/990,911), and the currently executed versions of combined Declaration and Power of Attorney for each of the applications by other co-inventors for the applications. Once again we also have tabbed where you need to sign your name as an inventor for each of the applications on the applicable Combined Declaration and Power of Attorney document.

As we both know, you in fact received the package that we sent to you on November 16, 2001. I confirm you left a voice mail for me on November 20, 2001, acknowledging receipt of the package and providing your cell phone number and home phone number. I also confirm you received a carbon copy of a message Andy Suhy sent to me on November 26, 2001 concerning the similar package he received. I responded to both of you promptly after receiving the e-mail message.

Further, I confirm that we had a telephone discussion within a day or so after I received the e-mail message from Mr. Suhy and responded. The discussion concerned the package provided to you on November 16, 2001, wherein you again refused to execute any documents associated with your former employer Dana Corporation despite your obligation to do so as an employee inventor at the time the inventions were developed. As we discussed, if a joint inventor refuses to join in an application for patent or cannot be found or reached after due diligent effort, the application may be made by the other inventors on behalf of himself or herself and the

RADER,

FISHMAN

& GRAUER
PLLC

Brent C. Parent
July 19, 2002
Page 2

non-signing inventor. A refusal to sign the Combined Declaration and Power of Attorney is such a refusal. As part of our discussion, you agreed to pass on the clarification of the reasons associated with the need for signatures to Mr. Suhy since you were in contact with him.

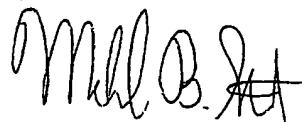
If you have any specific questions, please contact me. Otherwise, please return executed copies of the Combined Declaration and Power of Attorney documents for the two cases. You can keep the applications for your records. For your convenience we enclose a self-addressed and stamped Express mail envelope. All you have to do is to put the executed papers in the envelope and drop it in an appropriate US postal service mailbox.

In the absence of receiving the executed Declarations documents from you by July 29, 2002, we will be forced to conclude yet again that you will continue to refuse to sign them in accordance with your past efforts with respect to a number of different applications and share shall this refusal with the United States Patent and Trademark Office.

If you have any questions, please contact me.

Very truly yours,

RADER, FISHMAN & GRAUER PLLC



Michael B. Stewart

MBS/amv
Enc.

R0153725.DOC

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RADER,

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VIA FEDERAL EXPRESS
(Signature Release - Saturday Delivery)



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Michael B. Stewart
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November 16, 2001

Brent C. Parent
247 Stone Oak Court
Holland, OH 43528

Ref: 65678-0037
Dept:

Parent
SERVICE: PRIORITY SATURDAY
TRACK: 4702 6395 2904

Date: 16NOV01 SHIPPING \$11.34
Wgt: 1 LBS SPECIAL \$10.34
HANDLING \$0.00
TOTAL \$21.71

Re: U.S. Patent Application for APPARATUS AND METHOD FOR TRACKING
AND MANAGING PHYSICAL ASSETS
Dana Case 5397 DCCSP; Our Ref. 65678-0037

U.S. Continuation-in-Part Patent Application for SYSTEM AND METHOD FOR
DISPOSING OF ASSETS
Dana Case 5672 DCCSP; Our Ref. No. 65678-0042

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Dear Brent:

We apologize for continuing to send papers to you when you have expressed to me on more than one occasion that you refuse to sign any documents associated with your prior employment with Dana Commercial Credit Corporation.

We have already communicated with you concerning the above-identified 65678-0037 application. We have sent you a Combined Declaration and Power of Attorney, which you refused to execute. Our papers indicate that the copy of the Combined Declaration and Power of Attorney that we sent to you listed all of the inventors and the signatures of all co-inventors with the exception of Andy Suhy and yourself. Nevertheless, to address a potential issue raised by the U.S. Patent Office, we re-enclose a copy of this Combined Declaration and Power of Attorney and again request that you execute it and return it to my attention for filing. You have already received a copy of the application as a result of our prior correspondence. Nevertheless, we again enclose a copy of the application for your review. It would be greatly appreciated if you would execute the Combined Declaration and Power of Attorney and return it to my attention by November 28, 2001, so that we may timely file it with the U.S. Patent Office. For your convenience, we enclose a self-addressed, stamped envelope.

We would also appreciate your continued assistance with respect to the above-identified 65678-0042 application, which was filed on November 14, 2001. It is a continuation-in-part application. We enclose a copy of the Combined Declaration and Power of Attorney and Assignment that has been executed by most of the inventors for the application along with a copy of the application. We would appreciate it if you could sign these documents and return them to us.

Worldwide Intellectual Property Matters • Patents • Trademarks • Litigation • Copyrights • U.S. and Foreign Portfolio Management
Computer and Internet Law • Trade Secrets • Unfair Competition

Bloomfield Hills

Washington, D.C.

Denver

Salt Lake City

RADER,

FISHMAN

& GRAUER

PLLC

Brent C. Parent
November 16, 2001
Page 2

If it turns out that you are again unwilling to execute any of the enclosed documents, I would appreciate the courtesy of a telephone call so that I can so inform the U.S. Patent Office. My office telephone number is (248) 594-0633 as indicated above. If you wish to speak over the weekend, my home telephone number is (248) 644-1863. Finally, my portable number is (248) 390-0633.

Very truly yours,

RADER, FISHMAN & GRAUER PLLC



Michael B. Stewart

MBS/amv

Enc.

cc: Linda Lentz (w/enc.)
Robert M. Leonardi, Esq. (w/enc.)

R0130365.DOC



COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,
CONTINUATION, OR C-I-P)

As a below named inventor, I hereby declare that:

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TYPE OF DECLARATION

SEP 04 2002

This declaration is for an original application.

OFFICE OF PETITIONS

INVENTORSHIP IDENTIFICATION

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am an original, first and joint inventor of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

APPARATUS AND METHOD FOR TRACKING AND MANAGING PHYSICAL ASSETS

SPECIFICATION IDENTIFICATION

The specification was filed on November 16, 2000. I hereby authorize and request my attorney(s) of record in this application to insert the serial number and filing date of this application in the spaces that follow: Serial Number 09/714704 Filing Date: 11/16/00.

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56.



POWER OF ATTORNEY

I hereby appoint the following practitioner(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Michael B. Stewart

Registration Number 36,018

Robert M. Leonardi

Registration Number 27,815

Phillip A. Rotman II

Registration Number 38,290

I hereby appoint the practitioners associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

SEND CORRESPONDENCE TO

Michael B. Stewart
Rader, Fishman & Grauer PLLC
39533 Woodward Avenue, Suite 140
Bloomfield Hills, MI 48304

Customer Number: 010291

DIRECT TELEPHONE CALLS TO:

Michael B. Stewart
(248) 594-0600

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURES

J. Aaron Bly
Inventor's signature

Date 11-30-2000

Country of Citizenship USA

Residence 2650 Pine Trace Drive #4, Maumee, Ohio 43537

David P. Francis
Inventor's signature

Date 12/1/00

Country of Citizenship U.S.A

Residence 345 Wilderness Trail, Holland, Ohio 43528

John M. Melby
Inventor's signature

Date 11/29/2000

Country of Citizenship U.S.A.

Residence 2734 Sandalwood Drive, Toledo, Ohio 43614

Patrick O'Brien
Inventor's signature

Date 12/1/00

Country of Citizenship U.S.A

Residence 613 Midfield Drive, Maumee, Ohio 43537

Brent Parent
Inventor's signature

Date _____

Country of Citizenship _____

Residence 247 Stone Oak Court, Holland, Ohio 43528

Ryan J. Sherman
Inventor's signature

Date 11-29-00

Country of Citizenship U.S.A

Residence 430 E. Fifth Street, Perrysburg, Ohio 43551

Andrew F. Suhy, Jr.
Inventor's signature

Date _____

Country of Citizenship _____

Residence 1471 Indian Creek Drive, Perrysburg, Ohio 43551

UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application for an invention entitled

**APPARATUS AND METHOD FOR TRACKING
AND MANAGING PHYSICAL ASSETS**

By:

**J. Aaron Bly
2650 Pine Trace Drive #4
Maumee, Ohio 43537
USA**

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**John M. Melby
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**Patrick O'Brien
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**Ryan J. Sherman
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USA**

**Andrew F. Suhy, Jr.
1471 Indian Creek Drive
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USA**

Prepared by:

**Michael B. Stewart
Registration No. 36,018
Attorney Docket No.: 65678-0037
Customer No.: 010291
Rader Fishman & Grauer, PLLC
39533 Woodward Avenue, Suite 140
Bloomfield Hills, Michigan 48304**

APPARATUS AND METHOD FOR TRACKING
AND MANAGING PHYSICAL ASSETS

RELATED APPLICATIONS

5 This application claims the benefit of U.S. Application Serial No. 09/441,289 filed November 16, 1999, U.S. Provisional Application Serial No. 60/166,042 filed November 17, 1999, U.S. Application Serial No. 09/503,671 filed February 14, 2000, U.S. Application Serial No. 09/504,000 filed February 14, 2000, U.S. Application Serial No. 09/504,343 filed February 14, 2000, US Application Serial No. 09/653,735 filed September 1, 2000, and US 10 Application Serial No. 09/702,363 filed October 31, 2000, the contents of which are all hereby incorporated in their entirety by reference.

BACKGROUND OF THE INVENTION

15 The present invention relates in general to systems for tracking and managing physical assets to promote the efficient maintenance of the assets while reducing cost. In particular, this invention relates to a computer based system for automatically gathering, analyzing, and delivering information relating to the maintenance of a plurality of such assets, such as a fleet of industrial equipment, so as to maximize productivity and to reduce the operating costs and administrative burdens associated with such assets.

20 Many businesses operate a plurality of physical assets to assist in the performance of the daily activities that are required to produce goods or services. For example, a typical manufacturer of goods often uses a fleet of industrial equipment, such as forklifts, conveyors, machine tools, and the like, in its daily operations to facilitate the manufacture of goods for its customers. In a similar manner, a typical provider of services also often employs a 25 plurality of assets, such as computers, communications equipment, photo imaging equipment, and the like, in its daily operations to facilitate the performance of services for its customers. Traditionally, businesses have purchased such assets for use in their facilities and have employed staff to operate and maintain the assets in furtherance of the manufacture of goods or the performance of services.

30 Regardless of the specific nature of the business, the operation of these assets has usually been considered to be somewhat ancillary to the core nature of the business. In other words, although the use of these assets is helpful (indeed, sometimes necessary) for the business to manufacture the goods or provide the services in a cost efficient manner, the

ownership, operation, and maintenance of such assets is not, of itself, a core function of the business. Consequently, the costs associated with the procurement and utilization of such assets have not been traditionally monitored or analyzed by the business in great detail. Rather, such costs have usually been considered to be relatively fixed costs of doing business, 5 and any management of such assets has been performed, if at all, by relatively low level employees having little training or inclination to increase productivity and reduce costs.

Obviously, many businesses have been able to produce goods and provide services without actively managing the costs of obtaining and operating these assets. However, 10 optimization of productivity and minimization of costs are key considerations in the modern business environment. Thus, it would be desirable to provide a computer based system for automatically gathering, analyzing, and delivering information relating to the procurement and utilization of a plurality of such assets, such as a fleet of industrial equipment, so as to maximize productivity and to reduce operating costs and administrative burdens associated with such assets.

15 It would also be desirable to be able to provide different parties having an interest in the asset ready access to up-to-date real-time and historical access to the information associated with asset usage, maintenance, performance, and the like. For example, besides the business using the asset, there is often a third party maintenance organization that helps to maintain the asset and a leasing company acting as the true asset owner that leases the asset to 20 the business. Because the leasing company lacks appropriate information concerning the asset, the leasing arrangement typically takes this lack of information into account as part of the lease transaction, often through a combination of both a fixed lease amount tied to the asset regardless of use, as well as a financial cushion for the benefit of the true asset owner to cover unforeseen problems associated with the asset including over-use and improper 25 maintenance.

It would also be desirable to be able to provide different parties having an interest in the asset ready access to up-to-date real-time and historical access to the information associated with asset usage, maintenance, performance, and the like. For example, besides the business using the asset, there is often a third party maintenance organization that helps to 30 maintain the asset and a leasing company acting as the true asset owner that leases the asset to the business. Because the leasing company lacks appropriate information concerning the asset, the leasing arrangement typically takes this lack of information into account as part of

the lease transaction, often through a combination of both a fixed lease amount tied to the asset regardless of use, as well as a financial cushion for the benefit of the true asset owner to cover unforeseen problems associated with the asset including over-use and improper maintenance.

5 In some situations it is known to provide a fixed flat rate rental contract that has a variable overtime provision (e.g., an asset owner charges an asset user a flat rate plus an overtime charge in excess of a maximum usage level). However, a manual recordation of the additional time is required as opposed to automatic recording.

10 In other situations it is known to provide billing tied to calendar usage (e.g., monthly). However, such usage does not take into account objective usage criteria such as actual hours of operation during a fixed time period.

15 However, if the leasing company and the business both had ready access to the same information concerning the asset, the leasing company may be willing to share an increased portion of the financial risk/reward associated with the asset's usage, maintenance, performance, and the like. With appropriate objective information it may be possible to distribute a portion of the responsibility to other responsible third parties including the asset manufacturer or supplier, and asset maintenance organization.

20 It is known to record and store operational parameters or fault codes associated with the asset, which may be transmitted using a communications network to a central location for the purpose of undertaking diagnostics. It is also known to use handheld devices for the real-time sharing of information with a central system. The handheld device can access information from the central system such as the status of available inventory. The central system can also provide instructions to a user of the handheld device. Finally, it is known to use various electronic systems for monitoring inventory.

25 However, if each of the entities involved with an asset had ready access to the same information concerning the asset, and the ability to update that information as well as related information associated with maintenance of the asset on a real-time basis, the involved parties may be willing to share an increased portion of the financial risk/reward associated with the usage, maintenance, performance, or the like with respect to the asset. With appropriate 30 objective information it may be possible to distribute a portion of the responsibility to other responsible third parties including the asset manufacturer or supplier, and asset maintenance organization.

SUMMARY OF THE INVENTION

This invention relates to a computer-based system for automatically gathering, analyzing, and delivering information relating to the procurement and utilization of a plurality of such assets, such as a fleet of industrial equipment, so as to maximize productivity and to reduce operating costs and administrative burdens. Each of the assets is preferably provided with a data acquisition device for sensing and storing one or more operating characteristics associated therewith such as a fault code generated by the asset when there is a maintenance problem or when routine maintenance is required in accordance with predetermined criteria.

5 That information can be transmitted through space to a receiver connected to a local controller for storing such information and for transmitting such information over the Internet to a remote analysis system. The remote analysis system automatically updates individual records associated with each of the assets with the information received from the Internet. In response to such information, the remote analysis system automatically analyzes the newly 10 provided information and generates reports regarding scheduled maintenance, warranty coverage, and other management information. These reports can be transmitted back over the Internet to an administrative controller for review by one or more persons responsible for 15 managerial review. Additionally or alternatively, the remote analysis system can automatically post such reports on a website and, thus, be made available to one or more of 20 such persons upon request.

Not only can the information be provided to an administrative controller, but also it can be provided to third parties such as maintenance organizations, asset manufacturers or suppliers, and leasing companies. By providing up-to-date real-time and historical 25 information concerning the asset, such third parties are willing to share the risk of the asset's usage, maintenance, and performance through creative arrangements with the asset user. A maintenance organization, for example, may be willing to enter into a fixed maintenance contract when it has the ability to readily detect adverse maintenance trends regarding an asset and is given the ability to take pro-active steps to address problems before they become major. The cost-savings associated with such a pro-active approach by an expert may be 30 shared to the benefit of the business and the maintenance organization. Similarly, a leasing company that can reduce ownership risk through asset monitoring and appropriate asset

utilization is more likely to agree to a hybrid minimum term payment and asset usage billing system or even a usage based billing system with no minimum payments.

Various objects and advantages of this invention will become apparent to those skilled in the art from the following detailed description of the preferred embodiment, when read in light of the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic block diagram of a prior art computer based system for tracking and managing a plurality of assets.

10 Fig. 2 is a flow chart of a prior art method for tracking and managing assets in accordance with the prior art computer based system illustrated in Fig. 1.

Fig. 3 is a schematic block diagram of a computer-based system for tracking and managing a plurality of assets in accordance with this invention.

15 Figs. 4A through 4C are three portions, respectively, of a flow chart of a method for tracking and managing assets in accordance with the computer based system illustrated in Fig. 3.

Fig. 5 illustrates the relationship of various parties to a database associated with an analysis controller.

20 Fig. 6 is a flow chart of a subsystem illustrating the analysis of asset-related information to determine responsibility for asset utilization, and developing a lease relationship between an asset owner and an asset user based on asset utilization criteria.

Fig. 7 is a flow chart illustrating the providing of maintenance to an asset in further detail.

25 Fig. 8 is a flow chart illustrating what happens after a work order is generated based on maintenance approval.

Fig. 9 is a flow chart illustrating authorization subsystem 200.

Fig. 10 illustrates the operation of data acquisition and analysis subsystem 300.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

30 Referring now to the drawings, there is illustrated in Fig. 1 a schematic block diagram of a prior art computer based system, indicated generally at 10, for tracking and managing a plurality of assets, several of which are indicated generally at 11. The assets 11 are illustrated

as being a plurality of pieces of movable industrial equipment, such as a plurality of conventional forklifts or similar machinery, used in the manufacture of goods in a typical factory environment. However, the prior art method could be used to track and manage any type of asset 11, such as those described above, used in the manufacture of goods or the 5 performance of services. The basic structure and operation of each of the forklifts 11 are well known in the art and, therefore, require no discussion for a complete understanding of this invention.

The prior art system 10 further included a remote analysis system, indicated generally at 12, for tracking and managing the assets 11. The remote analysis system 12 was 10 completely separate and apart from the assets 11 and included an analysis controller 13 having one or more input devices 14 and one or more output devices 15 connected thereto. The remote analysis system 12 could be embodied as any conventional electronic controller, such as a microprocessor-based computer device. The input device 14 was embodied as a keyboard or other conventional mechanism for manually inputting data in electronic form to 15 the analysis controller 13 for processing in the manner described below. The output device 15 was embodied as a printer or other conventional mechanism for generating a hard copy of the management information generated by the analysis controller 13 in the manner described below.

Referring now to Fig. 2, there is illustrated a flow chart, indicated generally at 20, of a 20 prior art method for tracking and managing the assets 11 in accordance with the prior art computer based system 10 illustrated in Fig. 1. Throughout this discussion, reference will be made to a first person or entity that owns or operates the assets 11 that are being tracked and to a second person or entity that is responsible for tracking the management information relating to such assets 11. Notwithstanding this, it will be appreciated that a single person or 25 entity may not only own and operate the assets 11, but also track the management information relating thereto.

In an initial step 21 of the prior art method 20, a record was created for each individual asset 11 by the person or entity responsible for tracking such assets, such as one of the forklifts 11 illustrated in Fig. 1. This record was created electronically within the analysis controller 13 by means of the input device 14 and included a variety of information that was 30 desired to be tracked for management purposes. First, the record included information that uniquely identified the particular asset 11 being tracked. Such identification information

included, for example, data regarding the make, model, year, and serial number of the asset 11, plus any customer-assigned identification number. Second, the record included information that related to the operational characteristics of the particular asset 11 being tracked, such as the physical requirements or limitations of the asset 11 (mast height, load capacity, type of tires for the forklift 11, for example), the type of fuel used, and the period of time or usage between the performance of periodic maintenance. Third, the record included information relating to the acquisition of the asset 11 by the owner or lessee thereof. Such acquisition information included, for example, the type and date of acquisition (purchase or lease, for example), the name of the owner or lessee, the location at which the asset 11 is used, the expected amount of usage of the asset 11 (one, two, or three shifts, for example), and the cost of the acquisition or lease. Furthermore, the record included an area for adding additional information or remarks as desired.

In a second step 22 of the prior art method 20, it was determined whether a maintenance invoice had been received by the person or entity responsible for tracking the assets 11. Typically, a maintenance invoice was a written communication that was generated created by or at the request of the person or entity that owned or operated the assets 11. The maintenance invoice was usually generated upon the occurrence of an event relating to the particular asset 11 and generally contained information regarding the status of one or more operational characteristics of that asset 11. For example, after a particular forklift 11 had been operated by the person or entity that owned or operated the asset 11 for a particular period of time, it would require the performance of some maintenance. This maintenance may, for example, have constituted routine preventative service as a result of the elapse of a predetermined period of time or usage. Alternatively, such maintenance may have constituted non-routine service, such as a repair of a mechanical breakdown. In either event, a maintenance invoice was generated as a result of the performance of that maintenance. The occurrence of other events related to the assets 11 could also result in the generation of maintenance invoices. In many cases, the maintenance was performed by a maintenance organization having specialized knowledge of asset 11 and its long-term care.

Regardless of the nature of the event that caused them to be generated, the maintenance invoices were generated in hard copy form and contained therein certain information that was desired to be tracked for management purposes, such as the date and nature of the maintenance that was performed, the amount of usage of the asset 11 as of the

date of such maintenance, and the cost of such maintenance. To perform the second step 22 of the prior art method 20, the maintenance invoices were required to be physically delivered from the location where the assets 11 were being used or serviced to the location of the analysis controller 13 or to the location of the input device 14 of the analysis controller 13. 5 By physically delivered, it is meant that the maintenance invoice was transmitted in a non-electronic, hard copy form (including, for example, by facsimile) from the person or entity that owned or operated the asset 11 (and who performed, or had performed, the maintenance on the asset 11) to the person or entity responsible for tracking the assets 11.

As shown in Fig. 2, the prior art method 20 continuously repeated step 22 until it was 10 determined that a maintenance invoice had been received by the person or entity responsible for tracking the assets 11. When that occurred, the prior art method branched from the step 22 to a step 23, wherein the record contained in the analysis controller 13 relating to the particular asset 11 was updated with the information contained in the maintenance invoice. This step 23 was accomplished by utilizing the input device 14 to manually enter the 15 information contained in the maintenance invoice into the record relating to the particular asset 11 contained in the analysis controller 13.

Based upon the updated information contained in the record of the asset 11, the analysis controller 13 was programmed to perform a fourth step 24 of the prior art method 20, wherein it was determined whether a sufficient period of time or usage had elapsed as to 20 trigger the performance of periodic routine maintenance for that asset 11. Typically, such determination was made by determining the amount of the elapsed time or usage of the asset 11 (by comparing the most recent indication of the date or amount of usage of the asset 11 with the previous date or amount of usage contained in the record stored in the analysis controller 13), and by comparing such elapsed time or amount of usage with a predetermined 25 standard (also contained in the record of the asset 11 stored in the analysis controller 13). If it was determined that a sufficient amount of elapsed time or amount of usage had occurred, the method 20 branched from the step 24 to a step 25, wherein a hard copy maintenance report was generated by the output device 15. Then, in step 26 of the prior art method 20, the maintenance report generated in the step 25 was physically delivered from the person or entity 30 responsible for tracking the asset 11 to the person or entity that owned or operated the asset 11. The maintenance report advised the person or entity that owned or operated the asset 11 that the time had arrived for the performance of periodic routine maintenance.

Thereafter, the prior art method 20 entered a step 27, wherein it was determined whether a predetermined period of time had elapsed to generate a periodic management report covering some or all of the assets 11 being tracked. Alternatively, if in step 24 of the prior art method 20, it was determined that a sufficient amount of elapsed time or amount of usage had not yet occurred, the method 20 branched directly from the step 24 to the step 27. In either event, such management reports were typically generated on a monthly basis. Thus, if the end of the month had occurred, the prior art method 20 branched from the step 27 to a step 28 wherein a hard copy management report was generated by the output device 15. Then, in step 29 of the prior art method 20, the management report generated in the step 28 was physically delivered from the person or entity responsible for tracking the asset 11 to the person or entity that owned or operated the asset 11. The management report advised the person or entity that owned or operated the asset 11 of the status of some or all of the assets 11 that were being tracked, allowing various management oversight and decisions to be made at that time.

Thereafter, the prior art method 20 returned from the step 29 to the step 22, wherein it was determined whether a maintenance invoice had been created by or at the request of the person or entity that owns or operates the assets 11 and was physically delivered to the person or entity responsible for tracking the assets 11. Alternatively, if in step 27 of the prior art method 20, it was determined that a predetermined period of time had not yet elapsed to generate a periodic management report covering some or all of the assets 11 being tracked, then the method 20 returned directly from the step 27 to the step 22.

Referring now to Fig. 3, there is illustrated schematic block diagram of a computer based system, indicated generally at 30, for tracking and managing a plurality of assets, indicated generally at 31, in accordance with this invention. As with the prior art system 10 described above, the illustrated assets 31 are represented as a plurality of pieces of movable industrial equipment, such as a plurality of conventional forklifts or similar machinery, used in the manufacture of goods in a factory environment. However, the method of this invention can be used to track and manage any type of asset 31, such as those described above, used in the manufacture of goods or the performance of services.

As above, the basic structure and operation of each of the forklifts 31 are well known in the art, and, therefore, require no discussion for a complete understanding of this invention. However, unlike the forklifts 11 of the prior art system 10, a data acquisition device 32 is provided on each of the forklifts 31 for sensing and storing one or more operating

characteristics of the associated forklift 31. The basic structure and operation of each of the data acquisition devices 32 are conventional in the art. For example, each of the data acquisition devices 31 may be embodied as an electronic processor or controller that can sense or be otherwise responsive to one or more operating conditions of the associated forklift 31. Each of the data acquisition devices 31 can be responsive to any desired operating conditions of the forklift 31 that might be considered important in making effective management decisions regarding the operation of the forklift 31. Such desired operating conditions can, for example, include the time duration of use (and non-use), distances traveled, the extent of fork usage, the nature of hydraulic system utilization, and the like.

5 More typically for industrial assets, the most important criteria is time duration of use. The sensed operating conditions of the forklifts 31 are preferably stored at least temporarily in a memory of the data acquisition device 32 for subsequent communication to a remote analysis system, indicated generally at 50, for analysis in the manner described in detail below. Thus, 10 the data acquisition devices 32 sense and store the desired operating conditions for each of the forklifts 31 during use.

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Each of the forklifts 31 is further provided with a transmitter 33 or other communications system for transmitting the acquired data from the data acquisition device 32 to the remote analysis system 50 for analysis. Each of the transmitters 33 may be embodied as any conventional device for transmitting the acquired data to the remote analysis system 20 50, such as a hard-wired communications interface. However, as is well known, each of the forklifts 31 is a movable vehicle that is capable of traveling extensively throughout the particular environment in which it is used. To facilitate the transmission of the acquired data, therefore, the transmitter 33 is preferably embodied as a wireless communications system, such as represented by an antenna 34. The transmitters 33 and the wireless communications 25 systems 34 can be embodied as conventional radio frequency transmitters provided on each of the forklifts 31 that transmit electromagnetic signals. However, other well known forms of wireless communication, such as those utilizing light or sound, may be used in lieu of a radio frequency transmitter.

The wireless communications systems 34 are adapted to transmit signals that are 30 representative of the sensed operating conditions of the forklifts 31 through space to a receiver 35. In contrast to the forklifts 31 that can travel extensively throughout the environment in which they are operated, the receiver 35 is preferably provided at a fixed

location within that environment. If desired, a plurality of such receivers 35 may be provided at different locations within the environment in which the forklifts 31 are operated. As the forklifts 31 move about the environment during use, they will occasionally pass by or near the receiver 35. When this occurs, the receiver 35 receives the data transmitted from the respective data acquisition units 32. The receiver 35 is also conventional in the art.

5 Preferably, the data acquisition units 32 and the receivers 35 are in bi-directional communication with one another. One advantage of such bi-directional communication is that the data acquisition unit 32 can send out a query signal on a predetermined basis to be received by the receiver 35 when the two units 32 and 35 are sufficiently close to communicate reliably with one another. Thus, when the data acquisition unit 32 contacts the 10 receiver 35, the receiver 35 can send a first signal back to the data acquisition unit 32 to instruct it to begin transmitting the acquired data. At the completion of the data transfer, the receiver 35 can send a second signal back to the data acquisition unit 32 to acknowledge the receipt of the transmitted data. A conventional error checking algorithm can be used to 15 confirm the accuracy and completeness of the transmitted data and, if necessary, request a re-transmission thereof.

Another advantage of such bi-directional communication is that data in the form of new commands, program updates, instructions, and the like can be sent to the data acquisition units 32 from the receiver 35. In some instances, such as when a data acquisition unit 32 is in 20 generally continuous communication with a receiver 35, a user of the forklift 31 can be prompted to provide certain information for transmission to the receiver 35 for further analysis.

25 The receiver 35 is connected to a local controller 36. The local controller 36 is also, of itself, conventional in the art and may be embodied as an electronic controller that is adapted to receive and store at least temporarily the data from each of the receivers 35. Alternatively, if the assets 31 are fixed in position, such as in the case of a plurality of 30 stationary machines used in a manufacturing environment, the receiver 35 or receivers 35 may be provided on movable structures that move about the environment to receive the information transmitted therefrom. In either event, it is desirable that the local controller 36 acknowledge receipt of the information transmitted from the data acquisition devices 32, allowing the data acquisition devices 32 to delete the transmitted information and begin storing newly acquired information. A combined system including the data acquisition

device 32, the transmitter 33, the wireless communications system 34, the receiver 35, and software for operating the local controller 36 to gather and report data is commercially available, such as from I.D. Systems, Inc. of Hackensack, New Jersey or Requip (formerly SXI).

5 In a preferred embodiment, the various elements located in an asset 31 are hardwired into the electrical system of the asset to minimize the possibility of undesirable failure or tampering.

Thus, after the forklifts 31 have been operated for a period of time, the local controller 36 will have gathered and stored therein a certain amount of information regarding the 10 individual operating characteristics for each of the forklifts 31. The local controller 36 is programmed to periodically transmit the information stored therein to the remote analysis system 50 for analysis. This can be accomplished by providing the local controller 36 with a conventional modem 37 or other communications device that can convert the stored 15 information into a format that is compatible for transmission through an electronic communications network, such as the internet 40. As is well known, the Internet 40 is a digital electronic communications network that connects computer networks and organizational computer facilities around the world. Access to the Internet 40 can be easily obtained in most locations through the local telephone lines or by similar means.

20 The system 30 of this invention may be used to track and manage a plurality of assets 31 located at any desired physical location. Additionally, the system 30 of this invention may be used to track and manage assets 31 located at a plurality of different physical locations, as suggested by the dotted lines in Fig. 3. Each different physical location can be provided with 25 one or more receiver 35, a local controller 36, and a modem 37 to connect the system 30 to the Internet 40.

25 As mentioned above, the sensed operating conditions of the forklifts 31 are intended to be transmitted to the remote analysis system 50 for analysis. Referring again to Fig. 3, it can be seen that the remote analysis system 50 includes an analysis controller 51 that is connected to communicate through the internet 40 by means of a modem 52 or similar communications device. If desired, a communications server 51a may be connected between 30 the analysis controller 51 and the modem 52. The communications server 51a is provided to selectively receive and organize the information from each of the local controllers 36 for delivery to the analysis controller 51. The analysis controller 51 can be embodied as any

conventional electronic controller that is capable of receiving the sensed operating conditions of the forklifts 31 and for processing that information in a desired manner described in detail below. Ideally, the sensed operating conditions of the forklifts 31 are used to automatically generate and analyze management reports relating to the procurement and utilization of a plurality of the forklifts 31 to maximize productivity and to reduce operating costs and administrative burdens. An input device 53 and an output device 54, both of which are conventional in the art, may be connected to the analysis controller 51.

As also shown in Fig. 3, one or more administrative controllers 55 (only one is illustrated) can be connected to the internet 40 through respective modems 56 or similar communications devices. Each of the administrative controllers 55 can also be embodied as any conventional electronic controller that can request and receive information from the remote analysis system 50 through the Internet 40. In a manner that is described in detail below, the administrative controllers 55 are provided to request and receive the management information generated by the remote analysis system 50. If desired, the local controller 36 can also function as an administrative controller 55, although such is not necessary. An input device 57 and an output device 58, both of which are conventional in the art, may be connected to the administrative controller 55.

Referring now to Figs. 4A through 4C, there is illustrated a flow chart, indicated generally at 60, of a method for tracking and managing the assets 31 in accordance with this invention using the computer based system 30 illustrated in Fig. 3. Throughout this discussion also, reference will be made to a first person or entity that owns or operates the assets 31 that are being tracked and to a second person or entity that is responsible for tracking information relating to such assets 31. As above, it will be appreciated that a single person or entity may not only own and operate the assets 31, but also track the information relating thereto.

In an initial step 61 of the method 60, a record is created for each individual asset 31 by the person or entity responsible for tracking such assets, such as one of the forklifts 31 illustrated in Fig. 3. The record can be created electronically within the analysis controller 51 by means of the input device 53 and can include a variety of information that is desired to be tracked for management purposes, including all of the information described above in connection with the forklifts 11 and the analysis controller 13. Additionally, the record can further include information regarding the nature and time duration of a warranty provided by

the manufacturer or supplier of the assets 31. Such warranty information can be used in the manner described in further detail below to automatically determine whether the responsibility for the maintenance being performed on the asset 31, either in whole or in part, should rest with the manufacturer or the supplier of the asset 31 or with the owner or user of the asset 31.

In a second step 62 of the method 60, it is determined whether a maintenance invoice has been received by the person or entity responsible for tracking the assets 31. Such maintenance invoices can be generated and delivered in the same manner as described above. If it is determined that a maintenance invoice has been received by the person or entity responsible for tracking the assets 31, the method branches from the step 62 to a step 63, wherein the record contained in the analysis controller 51 relating to the particular asset 31 is updated with the information contained in the maintenance invoice in the same manner as described above. Next, the method enters a step 64 wherein the record contained in the analysis controller 51 relating to the particular asset 31 is updated with information from the internet 40. Alternatively, if it is determined that a maintenance invoice has not been received by the person or entity responsible for tracking the assets 31, the method branches directly from the step 62 to the step 64.

As discussed above, the local controller 36 will have gathered and stored therein a certain amount of information regarding the individual operating characteristics for each of the forklifts 31. The local controller 37 is programmed to periodically transmit the information stored therein to the remote analysis system 50 for analysis. The analysis controller 51 can include a memory circuit for storing this information from the local controller 36. The transmission of the information from the local controller 36 to the analysis controller 51 can be performed in real time, upon occurrence of predetermined events (such as the gathering of a predetermined amount of information), or at predetermined time intervals. In any event, the record contained in the analysis controller 51 is automatically updated with the latest information regarding the status of the asset 31, without any human intervention.

Based upon the updated information contained in the record of the asset 31, the analysis controller 51 next determines whether a sufficient period of time or usage has elapsed as to trigger the performance of periodic routine maintenance for that asset 31. This determination can be made in the same manner as described above in connection with 24 of

the prior art method 20. If it is determined that a sufficient amount of elapsed time or amount of usage had occurred, the method 60 branches from the step 65 to a step 66, wherein an electronic maintenance report is generated. If desired, a hard copy of the maintenance report can also be generated by an output device 54 connected to the analysis controller 51. Then, in step 67 of the method 60, the electronic maintenance report generated in the step 66 is delivered from the person or entity responsible for tracking the asset 31 to the person or entity that owns or operates the asset 31 through the Internet 40. As above, the maintenance report can advise the person or entity that owns or operates the asset 31 that the time has arrived for the performance of periodic routine maintenance. Moreover, if a specific fault code has been generated, that can be provided as well. Alternatively, the maintenance report 55 can be delivered to a specialized maintenance organization responsible for maintenance of the assets 31. The electronic maintenance report can, for example, be delivered through the Internet 40 to one or more of the administrative controllers 55 as desired. Alternatively, or additionally, the electronic maintenance report can be delivered through the Internet 40 to one or more of the local controllers 36. Also, in step 68 of the method 60, the electronic maintenance report generated in the step 66 is posted on a website maintained on the Internet 40. The website may be maintained either by the person or entity responsible for tracking the asset 31 or by the person or entity that owns or operates the asset 31 through the Internet 40. As opposed to the direct electronic delivery of the maintenance report to a particular person or group of persons contemplated in the step 67, the step 68 contemplates that the maintenance report is made available to such person or group of persons at their request over the Internet 40.

Thereafter, the method 60 enters a step 69, wherein it is determined whether any maintenance that has been performed on the asset 31 occurred within the warranty period provided by the manufacturer or supplier. Alternatively, if in the step 65 of the method 60, it was determined that a sufficient amount of elapsed time or amount of usage had not yet occurred, the method 60 branches directly from the step 65 to the step 69. In either event, this determination can be made by comparing the date of service or amount of usage of the asset 31 with the warranty information contained in the record for that asset 31 contained in the analysis controller 51. If it is determined that service on the asset 31 occurred within the warranty period, the method 60 branches from the step 69 to a step 70, wherein an electronic warranty report is generated. If desired, a hard copy of the warranty report can also be generated by the output device 54 connected to the analysis controller 51. Then, in step 71 of

the method 60, the electronic warranty report generated in the step 70 is delivered from the person or entity responsible for tracking the asset 31 to the person or entity that owns or operates the asset 31 through the Internet 40. As above, the warranty report can advise the person or entity that owns or operates the asset 31 that the service performed on the asset 31 should be paid for by the manufacturer or supplier of the asset 31. The electronic warranty report can, for example, be delivered through the Internet 40 to one or more of the administrative controllers 55 as desired. Alternatively, or additionally, the electronic warranty report can be delivered through the Internet 40 to one or more of the local controllers 36. Also, in step 72 of the method 60, the electronic warranty report generated in the step 70 is posted on a website maintained on the Internet 40. The website may be maintained either by the person or entity responsible for tracking the asset 31 or by the person or entity that owns or operates the asset 31 through the Internet 40. As opposed to the direct electronic delivery of the warranty report to a particular person or group of persons contemplated in the step 71, the step 72 contemplates that the warranty report is made available to such person or group of persons at their request over the Internet 40.

Thereafter, the method 60 enters a step 73, wherein it is determined whether a predetermined period of time has elapsed to generate a periodic management report covering some or all of the assets 31 being tracked. Alternatively, if in step 69 of the method 60, it was determined that a sufficient amount of elapsed time or amount of usage had not yet occurred, the method 60 branches directly from the step 69 to the step 73. In either event, such management reports are typically generated on a monthly basis. Thus, if the end of the month has occurred, the method 60 branches from the step 73 to a step 74, wherein an electronic management report is generated. If desired, a hard copy of the management report can also be generated by the output device 54 connected to the analysis controller 51. Then, in step 75 of the method 60, the electronic management report generated in the step 74 is delivered from the person or entity responsible for tracking the asset 31 to the person or entity that owns or operates the asset 31 through the Internet 40. As above, the management report can advise the person or entity that owns or operates the asset 31 of the same information as the management reports discussed above. The electronic management report can, for example, be delivered through the Internet 40 to one or more of the administrative controllers 55 as desired. Alternatively, or additionally, the electronic management report can be delivered through the Internet 40 to one or more of the local controllers 36. Also, in step 76 of the

method 60, the electronic warranty report generated in the step 74 is posted on a website maintained on the Internet 40. The website may be maintained either by the person or entity responsible for tracking the asset 31 or by the person or entity that owns or operates the asset 31 through the Internet 40. As opposed to the direct electronic delivery of the management report to a particular person or group of persons contemplated in the step 75, the step 76 5 contemplates that the management report is made available to such person or group of persons at their request over the Internet.

Fig. 4C demonstrates an additional functional aspect of method 60 using the inventive system. In addition to determining whether a maintenance invoice has been received, if 10 scheduled maintenance has been performed, and determining the party responsibility for certain maintenance activities, it is possible to poll asset data points at point 76 from an analysis controller database 78 associated with one or more discrete analysis controllers 51 that may be associated with one or more businesses. A plurality of databases 78 is shown. One or more separate databases may be combined to form a logical database 78. When a 15 maintenance organization has access to various asset fleets of the same type or make of equipment, it may be beneficial to analyze the relevant information using a larger available knowledgebase of information to analyze appropriate trends. By analyzing the data points, certain maintenance trends can be analyzed and problems can be anticipated before they affect asset utilization. For example, if it turns out that asset 31 has a tendency to need new 20 batteries after a certain period of usage; the need for such batteries can be anticipated and stocked on site when appropriate to facilitate maintenance. As shown in Fig. 4C, once the various trends have been analyzed for assets 31, at decision point 80 it is determined whether 25 preventative maintenance is required. If it is required, the maintenance is performed as shown at point 82 and the information is stored in database 78. The asset data points are then analyzed again until it is determined that no further preventative maintenance is required. Then the system terminates at point 84. Thus, figures 4A through 4C illustrate the use of critical information from assets 31 to perform maintenance and to provide a methodology for providing access to information by various third parties.

There are a number of significant advantages to having appropriate access to and the 30 ability to analyze data associated with an asset 31 and the interaction of various parties with that asset. Fig. 5 illustrates the beneficial interrelationships that promote efficiency by having the various parties associated in some way with an asset 31 in one or two-way communication

with analysis controller 51 either by way of administrative controller 55, reports 71 or 75, web site postings electronic mail, or the like. As illustrated, a maintenance organization 86, an asset manufacturer or supplier 88, asset user/business 90, and asset owner/leasing company 92 all at least provide information to analysis controller database 78 of analysis controller 51.

5 Both an individual user 85 and the asset 31 itself also provide data as illustrated in the figure and discussed herein. Therefore, at the very least each party is required to contribute pertinent information concerning its interaction with an asset 31 to database 78 of asset controller 51, where the information is available for further consideration and analysis.

As already discussed above, asset 31 provides usage and performance data that is stored in asset controller 51 according to certain predetermined criteria important for that asset including such things as asset location, model, age, usage, and maintenance status. Once relevant data is collected, it is possible to analyze utilization of a specific asset 31. It is also possible to analyze a class of assets 31 using one or more types of available data. From such an analysis, best mode practices can be developed with respect to asset utilization including preventative maintenance and a determination of the extent of optimum asset use. More specifically, for example, a business 90 may decide to standardize its fleet of assets, replace specific assets that have demonstrated unreliability, and either upsize or downsize a fleet to maximize safe asset utilization.

As discussed in greater detail with respect to Fig. 9 below, utilization of asset 31 by an individual user 85 is also tracked. A review of the available data can also provide detailed information on the interaction of a business 90 or individual users 85 with assets 31 as opposed to other businesses or users. From such an analysis it is possible to consider training issues, certification, and issues related to particular individuals, whose actions can have significantly influence asset utilization.

25 The role of other vendors such as part distributors, an example of another vendor 93, and maintenance organizations 86 can be compared with respect to other parties in similar roles or historical data to determine their effectiveness. While business 90 may provide its own maintenance of assets 31, a separate maintenance organization 86 is in the illustrated embodiment.

30 A vendor may be penalized or rewarded depending on the results of its activities, providing increased incentives to promote efficiencies. With respect to asset manufacturers or suppliers 88, it is possible to compare assets provided by different parties 88 to determine

how well their assets perform in practice. Thus, warranty issues, maintenance costs, lost operation time, and the like can be determined from an analysis of asset information over time or involving different manufacturers to provide guidance on how assets 31 from a particular manufacturer perform in different environments and as compared to competing assets of other manufacturers or suppliers in that environment.

More specifically, for an asset manufacturer or supplier 88, warranty information as shown by steps 70 through 72 of Fig. 4B is of particular interest. While it may not be appropriate for a supplier 88 to be able to alter information in database 78, the ability to quickly and accurately collect information concerning warranty obligations and the like is of particular benefit to all of the parties. For example, warranty issues may be caught more quickly, ultimately reducing asset cost and operation while simultaneously promoting asset up time.

The advantages of an asset owner 92 having at least one and possibly two-way access to the real-time and historical information stored in analysis controller database 78 as well as the ability to communicate with supplier 88, maintenance 86, and business 90, is illustrated in subsystem 98 illustrated in Fig. 6. It is assumed for the discussion that follows that the owner of the asset 31 is a separate asset owner 92 such as a leasing company, as opposed to business 90 itself, although this is not a requirement of the invention, subsystem 98 is often activated by the asset owner 92 using data from database 78, but typically utilizing its own lease administration and billing systems. In many cases it is also using its own fleet analysis and management systems, which are typically aggregating information from a number of different fleets associated with a plurality of businesses 90. These various systems, one or more of which may be used independently or in concert, are collectively shown at point 99. As noted above, web-site access, generated reports, analysis controllers 51, and administrative controllers 55 provide exemplary access points for pulling asset information from system 30.

An asset owner 92 and an asset user such as business 90 share the common interest in maximizing efficiency by taking into account such variables as asset usage and asset costs. The more information that is available, the more likely that efficiency is maximized. In traditional leasing relationships involving non-fixed or movable assets such as forklifts where minimal asset utilization information is available, the burden of determining the point of maximum efficiency typically rests with business 90, since it has control over the asset.

Therefore, a leasing company 92 typically enters into a lease arrangement where a fixed lease amount is paid in periodic payments by business 90 over the life of the lease. At best, only minor flexibilities are provided. When leasing company 92 regains control of an asset 31 at the end of the lease term, there is uncertainty concerning the condition of the asset. This 5 uncertainty also typically rests with business 90 in the form of a financial cushion incorporated into the leasing relationship.

However, such uncertainty is minimized in the present invention. As shown at point 100, asset owner 92 is able to analyze the various desired objectively generated asset data points associated with an asset 31. As noted above, these data points can include the time of 10 asset usage within a fixed time period, distance traveled, and certain performance parameters associated with the particular asset (e.g., hydraulic system usage or fork usage for fork lifts). As noted above, in practice, for industrial assets the time of use is the most important single 15 data point. Then, as shown at point 102, asset owner 92 may analyze maintenance considerations. For example, a major routine overhaul as compared to a system failure can be analyzed. Then at point 104, the asset owner 92 can compare the raw data from the asset with maintenance conducted during the same time period. By comparing the raw data with 20 maintenance considerations, the owner is able to analyze the asset utilization under the control of business 90 if maintenance organization 86 and supplier 88 are different third parties. For example, the asset owner 92 can determine that an asset 31 has been used very little during the time period, even allowing for maintenance. Alternatively, the owner may determine that the asset is being used continuously when not undergoing maintenance, possibly suggesting that additional assets may be appropriate to reduce overall maintenance 25 stress on the pre-existing asset.

Additional information can be analyzed by the asset owner as shown at decision point 25 106. Typically, the information includes data associated with other parties having access to database 78. As shown at point 108, for example, the asset owner 92 can evaluate the maintenance relationship with maintenance organization 86. If the relationship has been very positive, an appropriate incentive may be provided to the organization in the form of shared 30 cost savings. Alternatively, if the relationship has been negative, an appropriate penalty may also be implemented. The same considerations are available if business 90 acts as its own maintenance organization 86.

Similarly, the asset owner 92 may evaluate its relationship with the asset supplier 88 as shown at point 110. The information may affect asset payments from the owner to the supplier or the future relationship of the parties.

A further evaluation, shown at point 111, may include an analysis of individual users 5 themselves associated with a specific business 90 and their interaction with particular assets 31 or classes of assets, and such things as training level, certification, accident rates, and the like as discussed with respect to Fig. 9 and authentication subsystem 200 below.

One of the key advantages of the present invention is the ability to take data concerning any asset 31 and the interaction with that asset by any party, including user 85, 10 maintenance organization 86, asset manufacturer or supplier 86, business 90, asset owner 92, or other parties/vendors 93. Moreover, groups of assets may be combined. Thus, it is possible to analyze data to identify the cost of owning or using any asset 31 and the 15 productivity of that asset. Moreover, based on an adequately large statistical universe of data it is possible to benchmark asset utilization and cost against others in similar circumstances to identify best practices. Thus, it is possible to efficiency can be maximized while simultaneously minimizing unwanted waste by identifying time and cost saving opportunities. It is also possible to determine those parties providing best practice services with respect to 20 asset utilization (e.g., maintenance) so that their services can be expanded and appropriate recognition given for their efforts. Alternatively, it is possible to identify parties providing unacceptable services so that appropriate remedial action may be taken (e.g., a user 85 has inadequate training to properly use an asset so additional training needs to be provided).

In practice, the present invention provides a business 90 with a report screen showing information regarding the fleet associated with that business. Business 90 compares its current fleet information with its own historical information or pertinent information from 25 unnamed companies in the same general industry. A side-by-side comparison will be provided, thereby providing a business 90 or the asset owner 92 with guidance on how to improve fleet utilization using the best practices comparison.

These various advantages are applicable even if asset owner 92 and business 90 are the same entity. However, more typically with industrial equipment, asset owner 92 is 30 different than asset user 90, where the two parties have entered into a lessor/lessee relationship. In such a case, the information in database 78 may be used to mutually maximize the relationship between the asset owner 92 and the business 90. With appropriate

safeguards asset owner 92 may be willing to share in a greater portion of the risk associated with the utilization of asset 31 in determining a lease rate based on an analysis of each user fleet or individual asset as shown at point 112. Most significantly, rather than entering into a traditional fixed lease amount as noted above, asset owner 92 may be willing to enter into a hybrid lease arrangement wherein the lease charge may be a combination of one or more of the following elements: 1) a minimum payment that has to be made if asset utilization is below a pre-determined minimum threshold; 2) a usage based-payment that is made if usage is above the pre-determined minimum threshold and below a pre-determined maximum threshold; 3) a penalty payment or surcharge is made if utilization is higher than the pre-determined maximum threshold; and 4) payments/rewards based on incentive issues such as asset re-allocation or timely maintenance.

The decision of whether to use usage-based billing based on one or more objective criteria based on an analysis of asset utilization is shown at decision point 114. The decisions to charge either a minimum payment if a certain usage level is not met, or to charge a usage penalty above a maximum appropriate usage level, are shown by decision points 116 and 118 respectively. Thus, a variable-amount lease may be developed based on an analysis of objective criteria that is based in large part on the actual portion of an asset's life that is consumed by the asset user (e.g., usage hours). In a preferred embodiment, the analysis is based on a pre-determined usage/pricing matrix in combination with actual usage for a specified time period. Once a level of maximum efficiency has developed, leasing will typically be primarily, if not solely, based on asset usage billing.

Through the use of the innovative leasing arrangement based on improved information availability to asset owner 92, the expenses of an asset user such as business 90 can be more accurately aligned with usage and asset value consumption. More operational flexibility is provided to business 90. When leasing is based predominantly on asset usage billing, a business 90 is able to adopt true off-balance sheet financing (i.e., the business is not required to note a financial obligation even in the footnotes of various financial reports as opposed to standard off-balance sheet leasing where a company must disclose the lease in footnotes even if the lease does not show up on the balance sheet). At the same time, asset owner 92, can collect information from a variety of sources to maximize its relationships with its own vendors and customers to the benefit of all related parties by minimizing inefficiencies and

providing appropriate accountability with maximum accuracy and validity tied to a minimal likelihood for mistakes, misinformation, or even fraud.

These various factors can be adjusted dynamically by the asset owner 92 as a knowledge base is collected within its internal systems 99 and based on the actions of the 5 other related parties. For a sophisticated asset owner with numerous fleets, it can conduct appropriate analyses over all of its fleets to determine certain trends, which it may advantageously use.

For example, if supplier 88 or maintenance organization 86 is responsible for 10 abnormally low asset utilization as opposed to actions within the control of business 90, then the risk associated with these possibilities can be shared between asset owner 92 and various 15 affected businesses 90 and transferred in some fashion to the responsible party. Thus, in a more preferred embodiment of the invention, asset usage is adjusted for maintenance considerations if business 90 is not responsible for its own maintenance.

As shown at point 120, once the readily available information is analyzed in view of 15 the business relationship between an asset owner 92 and a business 90, an invoice and billing module associated with the asset owner's own internal systems 99 is invoked that generates an appropriate invoice that is sent by the asset owner to the business for payment and 20 subsystem 98 terminates at point 122. In a preferred embodiment, once subsystem 98 is developed for a particular situation, and in the absence of an extraordinary event, invoicing is automated based strictly on the objective criteria developed with minimal outside involvement.

A key advantage of the present invention is that real-time data is collected by data 25 acquisition device 34 and timely transmitted to local controller 36 for transmission to database 78 of analysis controller 51. If incomplete or limited data representing only a small portion of the appropriate asset data points are transmitted, then appropriate decisions cannot be made to maximize asset utilization. For example, in the case of forklifts, both time of usage and distance traveled help provide information concerning asset utilization and maintenance considerations.

Thus, the computer based system 30, including subsystem 98, of the present invention 30 provides a superior method for tracking and managing the assets 31 than the prior art system 10. First, by providing the assets with the data acquisition devices 32 and the communications system 33 and 34, the operational characteristics and other information

regarding the assets 31 is automatically sensed and transmitted to the analysis controller 51 on a real time basis, without requiring human intervention or assistance. Second, the analysis controller 51 is programmed to analyze such information as it is received and to automatically generate maintenance and warranty reports in response thereto. Third, all of the reports 5 generated by the analysis controller 51 are automatically delivered to the appropriate persons through the Internet 40, either directly to one or more of the administrative controllers 55 or by posting on a web site, electronic mail or similar mechanisms. Fourth, as shown by subsystem 98, the information can be used to maximize asset usage efficiency. As a result, the computer based system 30 facilitates the gathering, analyzing, and delivering of 10 information relating to the procurement and utilization of the assets 31 so as to maximize productivity and to reduce operating costs and administrative burdens to the benefit of all parties having a relationship with the asset and an interest in its performance.

The providing of maintenance to an asset 31 is illustrated in further detail in Fig. 7. In addition to determining whether it is necessary to provide scheduled maintenance as noted at 15 step 65 of Fig. 4A, changes in operational parameters associated with asset 31 as shown at point 150 may result in the generation of a specific fault code if a maintenance problem is detected that requires a more expeditious response. The fault code may be generated by the asset itself using one or more sensors associated with operational parameters of asset 31 as shown by point 152 and communicated to the data acquisition device 32. In addition, 20 analysis controller 51 may analyze the raw operational data received from the asset 31 and compare it with analysis controller database 78 including the history of the specific asset 31 as well as the history of similar assets from which maintenance trends may be determined as discussed with respect to Fig. 4C above. Based on an analysis of such trends, proactive lower cost maintenance can be timely performed that results in the avoidance of higher cost 25 maintenance at a later date, which happens in the absence of real-time information available for review and analysis.

A fault code may even be generated based on the actions of the asset operator. In a preferred embodiment of the invention, an electronic checklist 154 is completed by the asset operator on a regular basis, which may include information concerning asset performance that 30 is more detailed than that available from a review of raw operational parameters. In accordance with OSHA requirements, for example, at the end of each shift, a forklift operator must complete a checklist concerning the performance of the asset during the shift. Some of

the questions associated with checklist 154 are directed to maintenance issues. Therefore, in a preferred embodiment of the invention, checklist 154 would be completed electronically at the asset 31, and transmitted by way of the data acquisition device 32 to analysis controller 51 as discussed above. The information would be analyzed to determine if an OSHA/repair need is identified. Preferably, the analysis is automated in accordance with a comparison of the operational status with pre-determined rules. For example, if a question asks if there is a hydraulic leak for a forklift and the answer is "yes", then maintenance would be appropriate.

Once it is determined that maintenance of some type is required as shown at point 156 based on an analysis of the operational status of asset 31, a maintenance report 66 is generated as also shown in Fig. 4A and made available electronically at point 67' such as by the Internet or by posting on a website as also shown in Fig. 4A. The use of electronic mail, or the providing of real-time access to the raw data stored within database 78 by the maintenance organization 86, shown in Fig. 5, is also possible to generate the maintenance report 66. An advantage of providing a maintenance organization 86 real-time access to the raw data representing the operational status of asset 31 is that it may develop specialized analysis tools based on its own expertise in maintenance, resulting for example in the creation of specialized rules for use in automatically analyzing raw data in determining whether maintenance is required, minimizing the need for manual review and determination.

In a preferred embodiment, the priority of the proposed maintenance required 158 is noted on the maintenance report. For example, critical maintenance issues should take precedence over routine issues. Moreover, the system generally institutes an approval process as shown at point 160. For example, if the proposed maintenance is related to warranty work such as noted with respect to step 69 of Fig. 4B, the manufacturer or supplier should approve the maintenance. If a lessee is responsible for the proposed maintenance, it should approve the maintenance before it is performed. In some cases, the maintenance organization 86 itself approves the maintenance, such as when it has a contract that involves pre-payment of particular maintenance. Finally, as shown at point 162, in some cases it may be desirable to have the lessor or owner of the asset have the ability to review and override any refusals to perform maintenance since it has the ultimate responsibility for asset 31. If no approvals are given, the process is terminated at point 164. A review of any automated rules that generated a request for maintenance approval may also be appropriate. When maintenance approval is rejected, any automated rules that generated the original maintenance request can be fine-

tuned by including the results of the approval process. Over time, almost all maintenance requests should be generally approved. Information regarding approval is stored in database 78.

For preventative maintenance, it is expected that pre-approval will generally be granted by the necessary parties based on prior agreement as to the nature and timing of such maintenance.

Once maintenance has been approved, a work order 166 is generated. As shown in Fig. 8, work order 166 is sent electronically to appropriate maintenance personnel that contains all of the critical operating data required to effectively schedule and carry out the maintenance. Typically, for example, the data includes hour meter reading, any fault codes, asset identification criteria, operator of record, contact information, and asset location. Moreover, based on information contained within the fault code or retrieved from the knowledgebase, information concerning anticipated parts may also be provided as well as the nearest location from where they may be retrieved (e.g., at a customer location, or from a local servicing dealer). Finally, the work order 166 preferably contains the past recent history of the particular asset 31 so that the mechanic can use this information to expedite maintenance.

In a preferred embodiment of the invention, the work order 166 is transmitted electronically to a handheld device 168 associated with specific maintenance personnel assigned to carry out the maintenance. Device 168 includes an appropriate graphical user interface (GUI) that permits the receiving and transmitting of both alphanumeric and graphical based information. Examples of hand held devices include a variety of systems produced that use either the Palm® operating system from Palm, Inc. or a sub-set of Microsoft® Windows® from Microsoft Inc. Moreover, in a more preferred embodiment of the invention, the hand held device 168 is in real-time two-way communication with analysis controller database 78. Thus, under appropriate circumstances the handheld device 168 can access such things as dealer billing systems, inventory listings, customer work order approval records, and fleet management information. Rather than having the work order include the past recent history of the asset 31 to be serviced, it is possible to use the two-way communication link to request the necessary history when advantageous to do so.

Once the maintenance is completed, handheld device 168 is used to update database 78 as shown at point 170, including labor information and an identification of any parts

required to effect a repair. If not already clear based on the contents of database 78, the inventory location from which any parts were pulled should also be provided. Ideally, the information is transmitted on a real-time basis from the handheld device 168. Alternatively, however, the information can be transmitted upon routine synchronization of the handheld device with database 78. It is also possible to manually enter the information into the database 78.

5 The maintenance information is passed to database 78 where it may be used to generate maintenance tracking reports 172, and comprehensive invoices 174 listing both labor and part costs. Since the information is integrated with pre-existing asset information, no re-keying is required. Moreover, as noted above with respect to Fig. 4C, the complete 10 maintenance history of a particular asset or class of assets may be reviewed and analyzed in detail for specific trends of interest.

In addition, when parts are used, as shown at point 176, system 30 preferably permits comparison of the parts used with existing inventory for the specified parts storage location. 15 Based on maintenance trends associated with a class of assets 31 or a specific asset 31, it is possible for the system to automatically order replacement parts for an inventory location if the number of parts in a particular inventory fall below a pre-determined threshold as shown at points 178 and 180. The threshold is calculated at least in part based on an analysis of the prior maintenance of both the asset 31 and the class of assets associated with the asset. Other 20 factors may include the age of the class of assets, the time of the year, usage trends and the like. As one example, in the winter different parts may be required as opposed to in the summer. As another example, more tires may be required for a forklift asset if a number of the assets are reaching a preventative maintenance stage where tires have to be replaced. The system terminates at point 182.

25 It is also possible to provide online copies of parts catalogs including part numbers and exploded views of parts, including to hand held device 168. In some cases a comparison table of equivalent parts may be provided to reduce part acquisition timing or cost. Moreover, system 30 preferably keeps track of part availability and cost throughout a parts availability network. Thus, no one party is required to keep as many items in stock since 30 ready access to items stored at a different location is possible. Transaction costs in locating and requesting items from different locations is minimized since the information is readily

stored and accessible from system 30. Item stock reduction at any one location is also possible for the reasons discussed above where careful quantity controls are implemented.

Under some circumstances it may even make sense to have a central parts depository with inventory actually held and controlled by a third party such as a courier service. For 5 example, the courier service can ship parts as needed to effect a repair or replenish a reduced inventory at a remote location. With a central depository, the cost of maintaining the inventory can be borne by the party having the best ability to do so. For example, if an asset owner 92 has many businesses 90 using a class of assets 31, it may be able to provide economies of scale to the businesses by being responsible for ordering and stocking inventory 10 parts for use by all affected businesses. Non-related businesses may also be provided access to a part inventory at a higher cost, giving them a further incentive to actively participate in system 30 to enjoy improved economies of scale. Thus, system 30 provides enhanced customer service through reduced cost and a more efficient part access and ordering process.

Inventive system 30 provides a number of additional advantages for maintenance. For 15 example, through the use of electronic information transmission and analysis, maintenance information is transferred and available real-time for review and for the initiation of necessary actions such as approval, the tracking of performed maintenance, the ordering of replacement parts to replenish depleted inventories, and automatic invoice generation. Since asset 31 communicates its own maintenance needs in consultation with an appropriate knowledgebase 20 associated with database 78, human intervention is minimized. As more information is gathered over time, the scheduling of preventative maintenance can be optimized to eliminate either too little or too much maintenance. Further, system 30 automates a very paper-intensive and time cumbersome process by permitting direct communication with the various 25 information elements associated with an asset 31. As a result, the flow of data is more effectively controlled, dispersed, routed, monitored, and acted upon. In practice, the number of people involved in the maintenance process can often be reduced while the speed of providing maintenance can be increased. Thus, potential downtime and related performance issues can be more timely addressed.

A further aspect of the invention, authorization subsystem 200 within system 30, is 30 illustrated in Fig. 9. Authentication to access an asset 31 is tied to pre-determined rules. Specifically, authorization subsystem 200 keeps track of all individual users 85 using an asset 31. It prevents asset utilization by uncertified users 85. System 30 may require that a user 85

be trained or certified to utilize certain assets 31. Even if trained or certified, system 30 may only allow a user 85 to access an asset 31 for a limited period of time within a pre-set time range (e.g., OSHA or other work regulations may only permit access for ten (10) hours within every twenty-four (24) hours). Further, authentication may be denied if a user 85 is found to 5 have too many accidents. By tracking regulation requirements, training or certification issues and even accident rates, an asset 31 is more likely to be well maintained and well utilized. As a result, there are reduced operating costs, minimized potential fines through enhanced regulation compliance, and prolonged asset life through appropriate usage.

Apart from user 85, maintenance considerations may make an asset 31 unavailable. If 10 critical maintenance is required, the unavailability of an asset 31 may prevent unwanted problems resulting from inappropriate continued use, again reducing operating costs and extending asset life.

In other situations, authorization subsystem 200 is essentially a beneficial subscription service. For example, a single asset 31 may be available to different users at pre-set times 15 based on a reservation system, which is tracked through authentication subsystem 200. A prior reservation may take precedence over a desire to use an asset without such a reservation. Alternatively, access to an asset 31 may be terminated if payments to a third party such as maintenance organization 86, asset supplier 88 or asset owner 92 are in arrears. Of particular benefit, even when authorizing access, the ability to track usage with respect to a particular 20 user 85 permits different monetary or time-based asset access rates depending on the specific user or entity associated with that user.

As shown at point 201, a record of user 85 is created that may be stored in analysis controller database 78. The information associated with user 85 preferably includes such data 25 as a unique user code, user identification information (e.g., employer, location, address, and contact information) the number/class of assets for which the user is permitted access, safety record (e.g., number of accidents associated with each asset and over what period of total usage or time), and training or certification records.

A user attempts to access a particular asset at point 202. The access may be through the use of an access device 204 associated with the particular user (e.g., access card, magnetic 30 key, or key pad code) and a corresponding approval device 206 associated with an asset 31 that is connected to data acquisition device 32 for authorization confirmation. In turn, as noted above, data acquisition device 32 is associated with transmitter 33, which is in selective

communication with local controller 36. As shown at point 208, when a user attempts to access asset 31 for use, an attempt is first made to access remote system 50 for authorization. If communication is not possible, an attempt is next made to communicate with local controller 36 at decision point 210, which preferably includes a data cache for at least a sub-set of users 85 associated with a particular facility where an asset 31 is located. The data associated with local controller 36 may not be as up to date as that available from direct access to analysis controller database 78. In turn, if communication is not possible even with the local controller, an asset cache of data 212 associated with a particular asset 31 may optionally be available for access by approval device 206, as shown at decision point 214.

5 Once again, the data may not be as up to date. On the other hand, at times, the data cached within asset cache 212 or local controller 36 may be more up to date than that associated with system 50. The appropriate data is communicated between asset cache 212 and local controller 36, and then between local controller 36 and system 50, as communication between the appropriate devices takes place.

10 Once data related to asset 31 and user 85 is located, system 30 determines if user 85 is an authorized user for asset 31 at decision point 216, or if the asset 31 itself is available for user at decision point 218 in accordance with pre-determined rules or considerations such as those noted above. If authorization is not granted, a communication interface 220 associated with asset 31 preferably gives the reason for the denial and the steps required to obtain

15 authorization 222. It may even be possible to use communication interface 220 to provide interactive training and certification under some circumstances. As suggested above, a communication interface 220 may even be used to complete an interactive asset checklist as discussed above before and after asset operation by each user 85. Finally, even if approval is given, confirmation as well as special instructions or information of importance to user 85,

20 collected at point 224 (e.g., remaining access time, timing for re-training or re-certification, or next scheduled maintenance) may be displayed to the user.

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Finally, if a user 85 is not authorized, either because of communication problems or issues associated with either the user or the asset itself, preferably some type of supervisory override, such as a master access device or code and shown at decision point 226, may be selectively implemented between devices 204 and 206 to permit asset utilization. Even if there is such an override, however, information associated with asset utilization is still recorded and communicated as taught above.

Finally, any pertinent authentication subsystem data is stored in database 78. Moreover, pre-determined rules may be established that provide automatic instructions to system 30 when such authentication subsystem data should be communicated to a third party such as a supervisor, trainer, or security personnel as a result of a user attempting to access an asset 31 as shown at point 230. For example, if a user 85 needs to have additional training, that information needs to be communicated to the appropriate party (e.g., supervisor and trainer). Training may take place using internal personnel or it may be outsourced to a vendor 93 (shown in Fig. 5) in a manner similar to maintenance, as discussed above. System 30 makes it possible to schedule training and even track the cost and corresponding benefits of training through access to real-time and historical asset or user data not generally available except in accordance with the teachings of the present invention. As another example, if unauthorized personnel attempt to use an asset 31, it may be appropriate to send an urgent message to appropriate security personnel at the location of asset 31. Finally, authentication subsystem 200 terminates at end point 232.

As shown most succinctly in Fig. 5, numerous parties have access to analysis controller database, which stores data with respect to asset 31 and various parties having a relationship to that asset. The collected data may be used or analyzed in any one of a number of different ways depending on the interests of the party. For example, a maintenance organization is interested in using the data available to improve maintenance and reduce associated costs; asset supplier 88 desires to examine and minimize warranty issues; and asset owner/leasing company 92 desires to appropriately maximize its return on investment, a desire shared with each business 90. From the perspective of an individual user 85, such issues as appropriate training and certification have also been discussed.

“What if” inquiries are particularly important to successful implementation of system 30. For example, when proposing the use of system 30 to a party such as a potential customer, the ability to analyze historical data and performance with respect to similarly situated customers is invaluable to provide a breakdown of costs and possible cost savings. As noted above, with appropriate information, an asset owner 92, such as a leasing company, may be able to share in part of the risk of asset utilization with appropriate data access and control.

To facilitate these types of analyses, it is important to have robust access to analysis controller database 78, which can actually be one or more databases of information tied

together so as to be accessible for the purpose of an analysis of system 30. In a preferred embodiment, hand held device 168 or a similar type of computing device provides a desirable access point to database 78.

However, before the parties can take advantage of system 30, it is essential to create a 5 foundational base of information that provides a framework for further analysis. Ideally, pre-created forms or templates help facilitate data collection and analysis. For example, when talking to a potential customer, it would be helpful to have access to cross-reference materials related to competitor assets, lease pricing rate factors, historical data and the like. Certain query forms can be used to collect relevant raw data and other query forms can be used to 10 retrieve useful data based on a consideration of the raw data to provide the basis for recommended courses of conduct to promote safe utilization and efficiency while reducing costs. Thus, the actual analysis typically takes place at a central location having the appropriate computational resources with the results preferably being transmitted to hand held device 168. Under some circumstances, an analysis is possible directly on-site using the data 15 collected and analyzed without direct access to database 78 based on a sub-set of data and logic protocols in the form of analysis tools stored on hand held device 168.

Even when not in real-time contact with database 78, hand held device 168 is often invaluable. It permits the automation of survey data entry by an account manager so that information concerning assets 31, a business 90, individual users 85, and other related parties 20 may be entered on-site and later transferred to database 78. The use of paper forms and manual translation of information is eliminated, speeding up data entry. For example, in the past an account manager might have handled more than twenty (20) data sheets that tracked specifications of the current fleet of assets 31 for a new customer business 90. The data sheets were taken back to the office and manually entered into a local database. 25 Simultaneously, an intermediate source of error related to manual keying or a similar translation method is eliminated.

A data acquisition and analysis subsystem 300 is illustrated in Fig. 10. Subsystem 300 facilitates the collection of raw fleet survey data 302 upon initiation of system 30 by a party so that a baseline level of data may be provided to system 30 for consideration and 30 analysis. An account manager 304 collects raw data with respect to each affected asset 31 and all parties having interaction with the asset such as the parties identified with respect to Fig. 5 above. Of course, other parties may also contribute fleet survey data if they have

interaction with an asset 31. The data is preferably inputted into a handheld device 168 using pre-defined forms 306, transmitted to a desktop computer 308, and then ultimately stored in analysis controller database 78. To help with analysis of particular data, the process may be reversed, with data pulled from database 78 to desktop computer 308, transmitted to hand held device 168, and used by account manager 304 to perform a desired analysis for any affected party.

Preferably, hand held device 168 uses an operating system 312 provided by Palm, Inc. A forms manager 314 from Puma Technologies, Inc. known as the Satellite Forms software development package is used to generate data forms 306, which are used to enter the required 10 information or display stored data from hand held 168 or from analysis controller database 78. When collecting raw data, account manager 304 follows inquiries associated with form 306 to enter required information. In contrast to manual methods, it is preferably possible to advise when inappropriate data is entered or if a field is missed. Thus, any data entry errors can be addressed on the spot when the source of the original data is readily available. Hand 15 held device 168 stores locally collected data 316 such as fleet survey data 302, may include retrieved data 318 from database 78, and a number of different analysis tools 320 for evaluating the stored data. For example, one analysis tool 320 may use a set of rules to estimate the total life of an asset under the circumstances currently in place at a business 90 and compare them to known "best practices" for the same asset along with proposed process 20 changes to increase asset life to reach the "best practices" level.

Preferably, computer 308 includes an operating system 322 provided by Microsoft such as Windows® 98, Windows® Millenium or Windows® 2000. It has a plug-in 324 provided by the party responsible for hand held operating system 312 to provide a synchronization conduit 326. Synchronization is handled through a conventional or USB 25 serial data port on the desktop computer 308 and a cradle hardware device 328 associated with device 168. During use of synchronization conduit 326, data values and associated data stored on hand held device 168 and desktop computer 308 are interchanged in accordance with parameters provided in forms manager 314 and a corresponding forms manager computer plug-in 330 on desktop computer 308. Desktop computer includes data from hand 30 held device 168, data from database 78 to either be used locally by the computer or transferred to hand held device 168, data received from device 168 or manipulated locally

using one or more analysis tools 332, and data to be transmitted to database 78 for long-term manipulation or storage.

For example, when using subsystem 300 to transfer fleet survey data 302 that has been placed into hand held device 168 as locally collected data 316. The data transmitted includes 5 both data elements and lists of value fields identifying a data source and the specific data values populating each data element. The data is then transferred to database 78 from desktop 308 in accordance with pre-determined rules. Preferably, the data is associated with fixed fields that are consistently defined between hand held device 168 and database 78 so that the data merely populates the appropriate fields within database 78 after it is transferred 10 from the hand held device. Alternatively, the data may be uploaded into a local analysis tool 332 of desktop 308 such as a database or spreadsheet program for final manipulation and then storage in asset controller database 78.

More particularly, in a preferred embodiment of the invention an account manager 304 who is about ready to visit a business 90 determines the type of information that is 15 relevant to be collected during the visit. Using the desktop computer, a list of values as well as data query forms are downloaded from asset controller database 78 and stored on the local desktop computer hard drive, and then transferred to hand held device 168. For example, when first taking an inventory of pre-existing assets for a new business 90, a list of valid value identifiers for forklift analysis may include the following data elements:

- 20 1) Overall customer information
- 2) Customer division information
- 3) Locations of facilities within each division where forklifts are used
- 4) Departments within each facility that use the forklifts
- 5) Broad descriptions of the types of ways or industries for which the forklifts are used
- 25 6) For each forklift:
 - a) Manufacturer/Supplier
 - b) Power supply type
 - c) Mast type
 - d) Tire type
 - e) Forklift attachments
 - 30 f) Forklift type/model
 - g) Forklift serial number

- h) Any label used by a customer to uniquely identify the forklift
- i) Date the forklift went into service
- j) Number of hours that the forklift has been in use according to its meter.
- k) Lease/rental contract information
- 5 l) Maintenance history
- m) Maintenance contracts.
- n) Forklift dealer
- o) The number of months/and/or usage hours covered pursuant to the manufacturer/supplier warranty.
- 10 p) Original purchase cost
- q) Manufacturing date
- r) Forklift condition (e.g., based on a scale such as new or used)
- s) Application rating (e.g., heavy, medium or light)
- t) Administration fees charged for providing financing/maintenance or the like
- 15 u) Criteria providing feedback concerning the number of hours at which preventative maintenance should be performed
- v) Capacity, typically in pounds or kilograms
- w) Number of hours or shifts the forklift is used each day
- x) Number of days a week that a forklift is used

20 The tables are downloaded to hand held device 168 using synchronization conduit 326 and the relationship between forms manager 314 and forms manager computer plug-in 330. In practice, the transfer of data value tables and their related values has also included the use of a program written in a product called Sybase Powerbuilder from Sybase, Inc. Under such circumstances analysis controller database 78 is a Sybase database. Further, desktop 25 computer 308 may include a different database manipulation program called DBASE acting as one of the local analysis tools to review and possibly manipulate data received from hand held device 168 or analysis controller database 78 before forwarding it to the receiving device.

The collection of fleet survey data 302 is merely an example of subsystem 300 in use. 30 Moreover, even when an account manager 304 is collecting fleet survey data 302, it is preferred that if some of the data associated with a survey is already stored in database 78 (e.g., customer contact information, divisions, or asset locations), it is used to pre-populate

appropriate forms 306 to simplify redundant data entry by the account manager. Further, if an error exists based on an inaccuracy in the pre-existing data, account manager 304 can correct it.

The collected and manipulated data provides a starting point for each asset 31 going forward as well as a base foundation for immediate asset fleet analysis since at least some historical data has preferably been collected for existing assets. Thus, even at the beginning of the utilization of system 300, the initially collected data can be analyzed in accordance with pre-existing data involving other fleets, best practices, and the like, to provide immediate guidance on how to improve current fleet utilization and efficiency. The same subsystem 10 may be used to transfer data and recommendations back to hand held device 168, except that this time forms 306 perform a data presentation function as opposed to a query function. As suggested above, some analysis of data may be performed directly on hand-held device 168 although more sophisticated analysis tools 332 are typically associated with desktop computer 308 or asset controller 51 in view of their enhanced computational power and storage 15 capabilities.

Subsystem 300 has been shown using synchronization. It is recognized of course, that real-time access is also possible between hand held device and either asset controller 51 or desktop computer 308 without the need to use cradle 328. An advantage of real-time access between a hand-held device 168 and database 78 is that information may be immediately 20 transmitted and received, providing access to the full range of data values and associated data available in database 78. The uploading and downloading of pre-created data forms 306 to help facilitate the collection and analysis of data is also expedited. Further, under some circumstances real-time error checking may be available. For example, if an account manager 304 indicates the number of assets available at a physical location and the actual number in 25 database 78 is different, the manager can be asked to undertake verification while still present at the physical location. Otherwise, to the extent that there are discrepancies, they may be considered after data synchronization takes place.

The same methodology discussed with respect to subsystem 300 may also be used by maintenance personnel as discussed with respect to Fig. 8 above. Work order 166 acts as a 30 pre-populated form 306 transmitted to a hand held device 168. Once the maintenance is completed a different form 306 may be used to communicate the necessary maintenance labor

and parts information so that a maintenance tracking report 172, invoice 174, and determination of inventory replenishment 178 may be implemented.

In accordance with the provisions of the patent statutes, the principles and modes of operation of this invention have been explained and illustrated in preferred embodiments.

5 However, it must be understood that this invention may be practiced otherwise than as specifically explained and illustrated without departing from its spirit or scope.

CLAIMS

What is claimed is:

1. A system for gathering and analyzing data relating to a non-fixed movable asset comprising:
 - a local controller located at a first location for acquiring data that is representative of at least one operating characteristic of the asset;
 - an analysis controller located at a second location that is responsive to said acquired data from said local controller for generating an analysis of said acquired data;
 - an electronic communications network connected between said local controller and said analysis controller and permitting transmission of said acquired data from said local controller to said analysis controller; and
 - a hand held device receiving at least a sub-set of said acquired data stored in said analysis controller.
2. A system as recited in claim 1, wherein said hand held device is in direct contact with said analysis controller.
3. A system as recited in claim 1, wherein a second computer system is disposed between said analysis controller and said hand held device.
4. A system as recited in claim 3, wherein said second computer system receives said acquired data, selectively modifies aspects of said acquired data, and forwards said acquired data including said modified aspects, to said hand held device.
5. A system as recited in claim 1, wherein said hand held includes forms, said forms providing data values for the entry of foundational data associated with said data values, said data values and said foundational data being transmitted to said analysis controller.
6. A system as recited in claim 5, wherein said foundational data is collected prior to said acquired data.

7. A system as recited in claim 1, wherein said hand held receives parts data associated with the asset, said parts data in the form of at least one of inventory, inventory location, and a parts catalog.

8. A system as recited in claim 1, wherein said analysis controller includes a database, said database including data values, collected data and comparison data being available for a selected data value.

9. A system as recited in claim 8, wherein said comparison data represents one of a best practice level and past historical data to provide a base point for comparison with said collected data.

10. A system as recited in claim 8, wherein said collected data includes at least user data representing a user accessing the asset.

11. A system as recited in claim 10, wherein said user data includes at least a subset of user identification, and access authorization.

12. A system as recited in claim 11, wherein said access authorization includes an analysis of user training or user certification with respect to a class of assets including the asset.

13. A system as recited in claim 10, wherein said system includes an authorization subsystem, said authorization subsystem including an asset access mechanism to receive said user identification from a data transmission point associated with the asset and comparison of said user identification from said data transmission point with said user identification from a remote database to confirm the identify of said user.

14. A system as recited in claim 12, wherein said remote database is one of said local controller and said analysis controller.

15. A system as recited in claim 12, wherein said user identification is compared to access authorization to confirm proper authentication, said asset access mechanism permitting operation of the asset upon proper authentication.

16. A system for gathering and analyzing data relating to a non-fixed movable asset comprising:

a local controller located at a first location for acquiring data that is representative of at least one operating characteristic of the asset;

an analysis controller located at a second location that is responsive to said acquired data from said local controller for generating an analysis of said acquired data;

an electronic communications network connected between said local controller and said analysis controller and permitting transmission of said acquired data from said local controller to said analysis controller, said analysis controller including a database, said database including data values, collected data and comparison data being available for a selected data value; and

a hand held device including a form, said form providing at least a subset of said data values for the entry of foundational data, said foundational data being transmitted to said analysis controller and stored in said database.

17. A system as recited in claim 16, wherein said comparison data represents one of a best practice level and past historical data to provide a base point for comparison with said collected data.

18. A system for gathering and analyzing data relating to a non-fixed movable asset comprising:

an asset access device;

a local controller located at a first location for acquiring data received from said asset access device that is representative of a request for user authentication;

an analysis controller located at a second location that is responsive to said user authentication to generate an analysis of said request; and

an electronic communications network connected between said local controller and said analysis controller and permitting transmission of said request from said local controller to said analysis controller.

19. A system as recited in claim 18, further including an authorization subsystem, said asset access device receiving a user identification, said user identification being compared with a corresponding user identification stored in said asset controller, and providing selective access authorization based on additional user data stored in said asset controller for said user identification.

20. A system as recited in claim 18, wherein said additional user data includes at least one of user training or user certification with respect to a class of assets including the asset.

ABSTRACT OF THE DISCLOSURE

A computer based system automatically gathers, analyzes, and delivers information relating to the procurement and utilization of a plurality of such assets, such as a fleet of industrial equipment, so as to maximize productivity and to reduce operating costs and administrative burdens. Each of the assets is preferably provided with a data acquisition device for sensing and storing one or more operating characteristics associated therewith. That information can be transmitted through space to a receiver connected to a local controller for storing such information and for transmitting such information to a remote analysis system. The remote analysis system automatically updates individual records associated with each of the assets with the information received. In response to such information, the remote analysis system automatically analyzes the newly provided information and schedules maintenance as required. Information associated with the maintenance is also recorded electronically to maximize efficiency, provide historical trends, automate billing, and control inventory levels. The invention also includes an authentication subsystem and a mechanism for using a hand held device to collect and analyze data.

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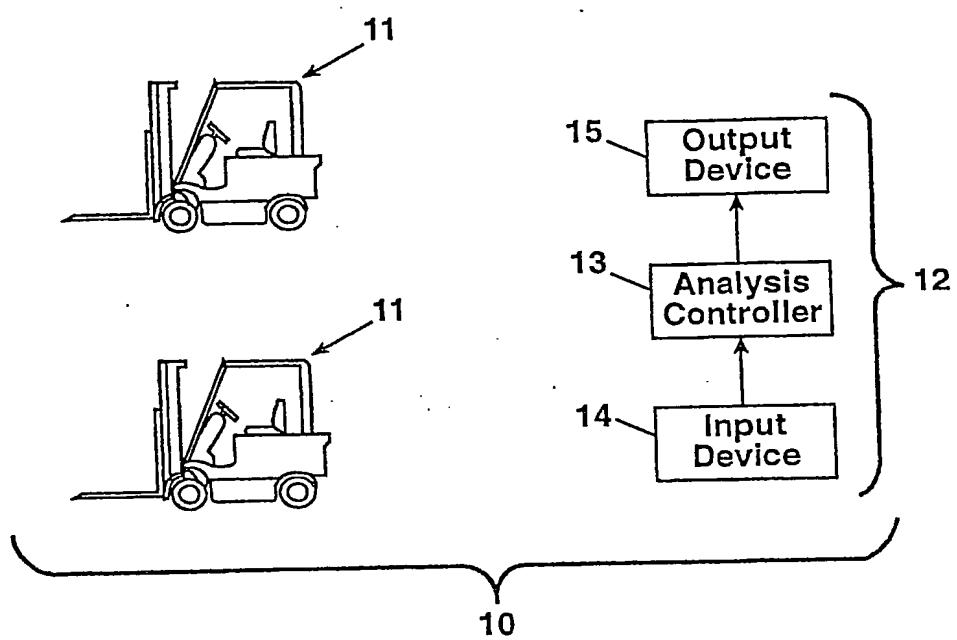


Fig. 1 (PRIOR ART)

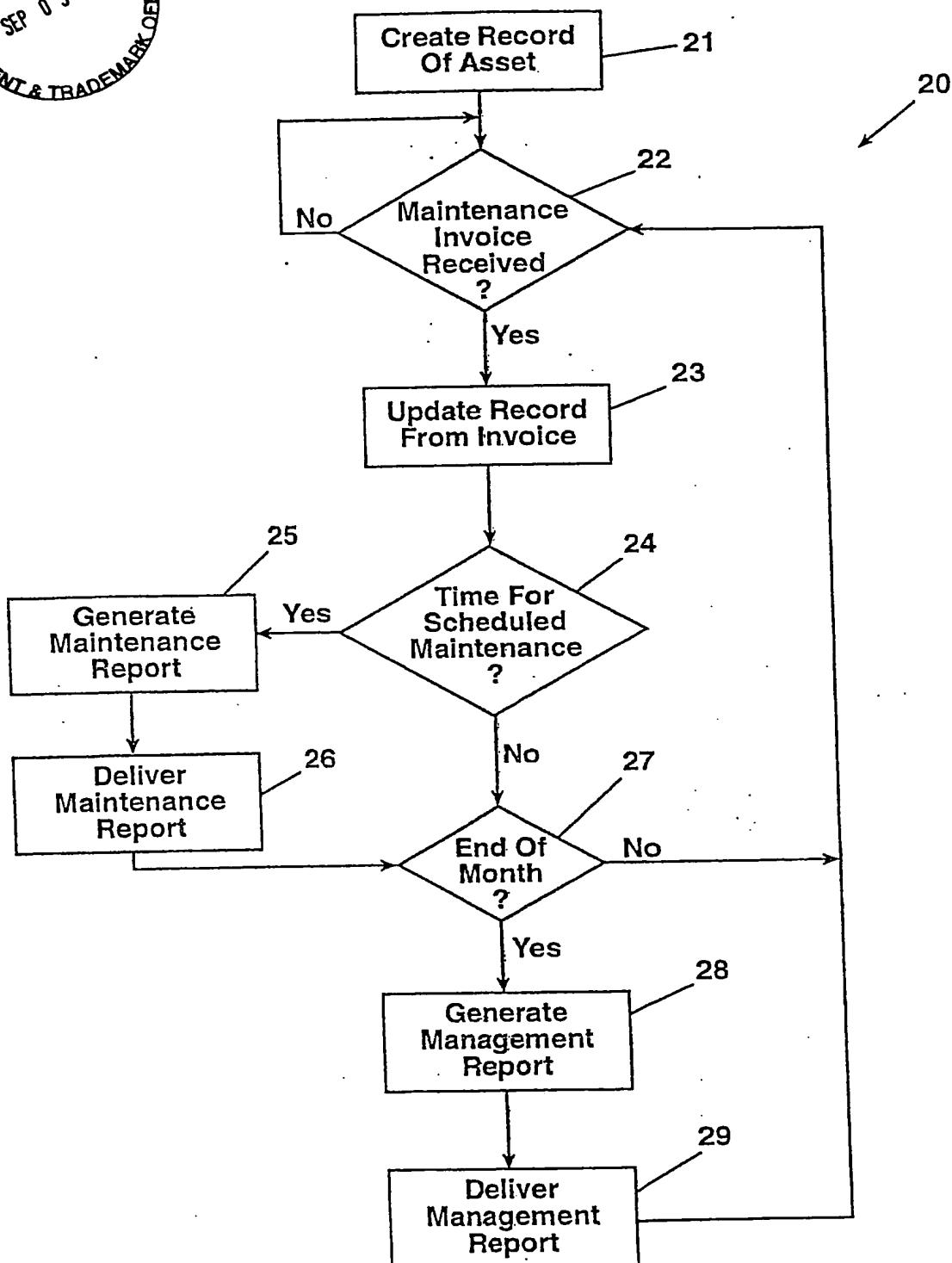


Fig. 2 (PRIOR ART)

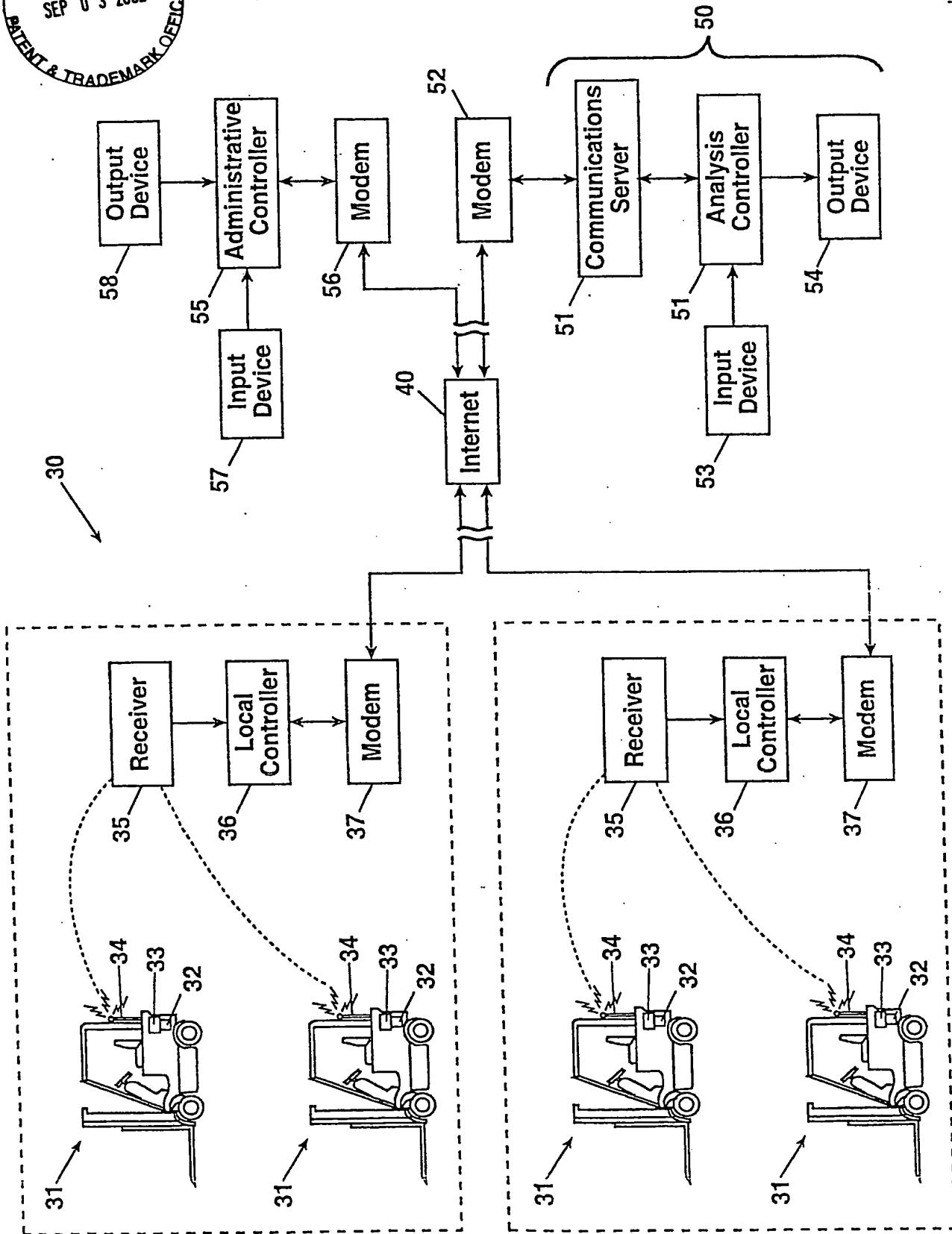
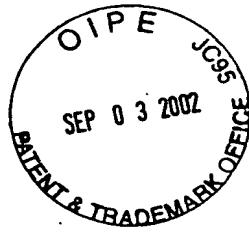


Fig. 3

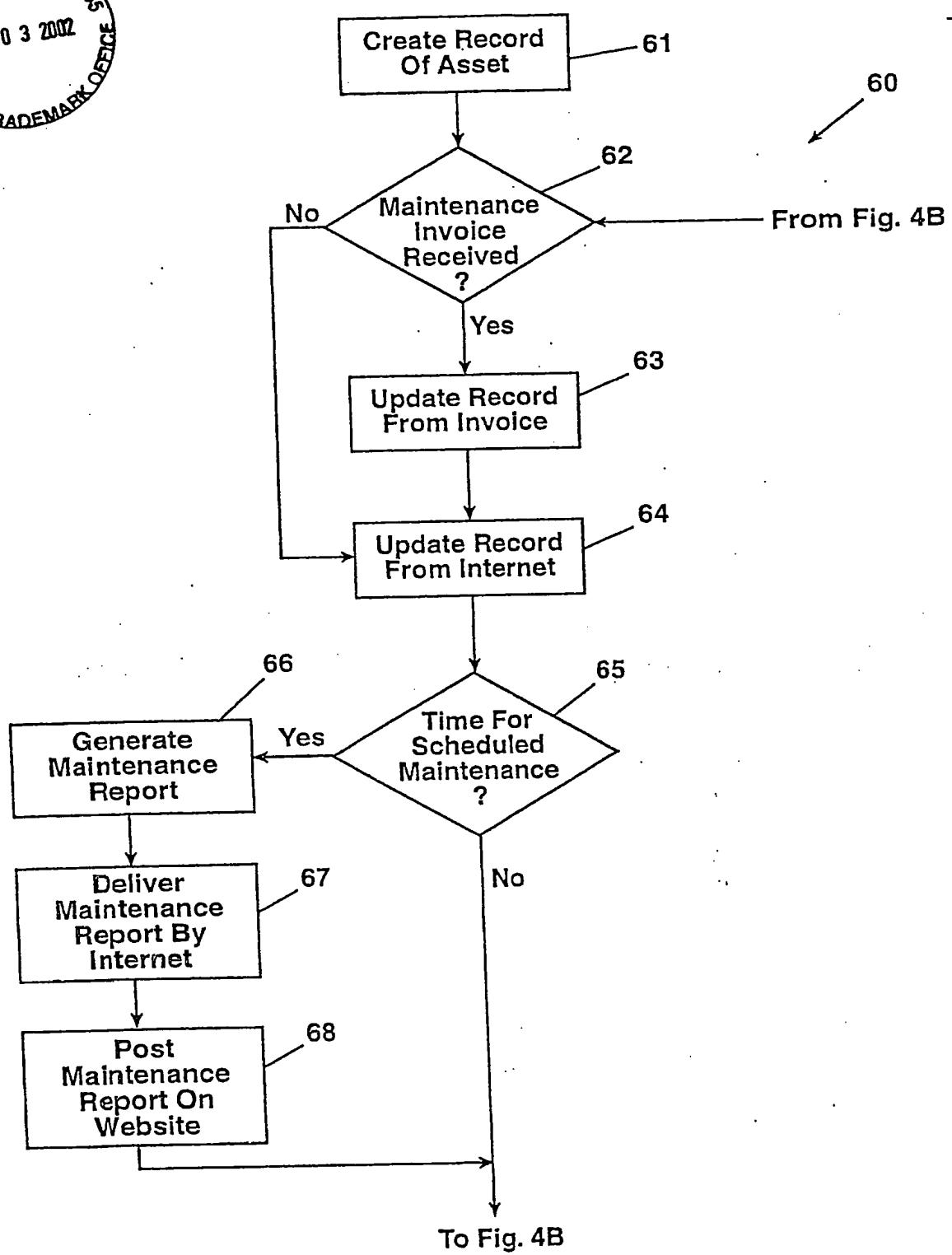


Fig. 4A

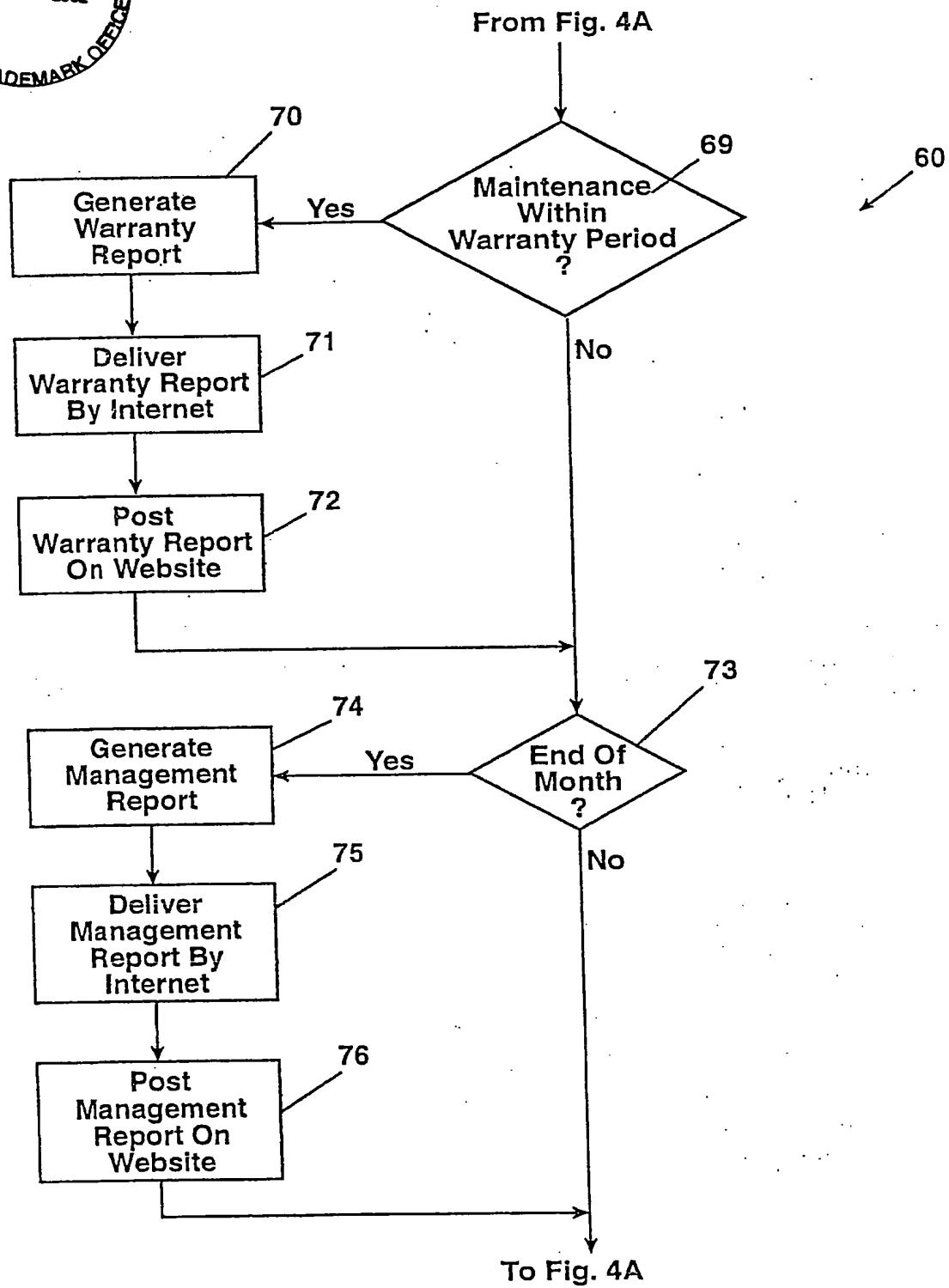
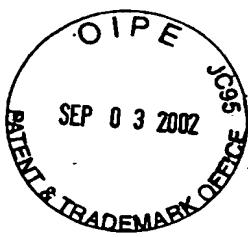
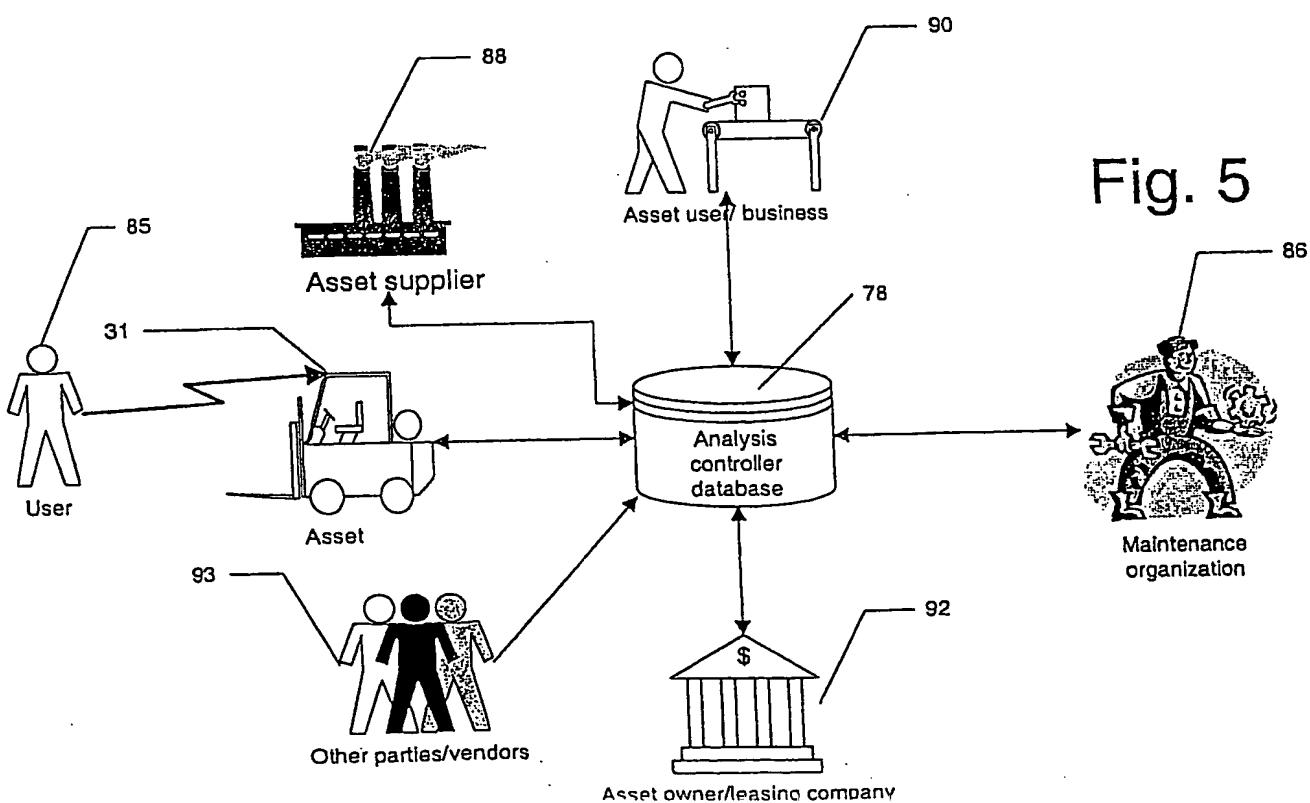
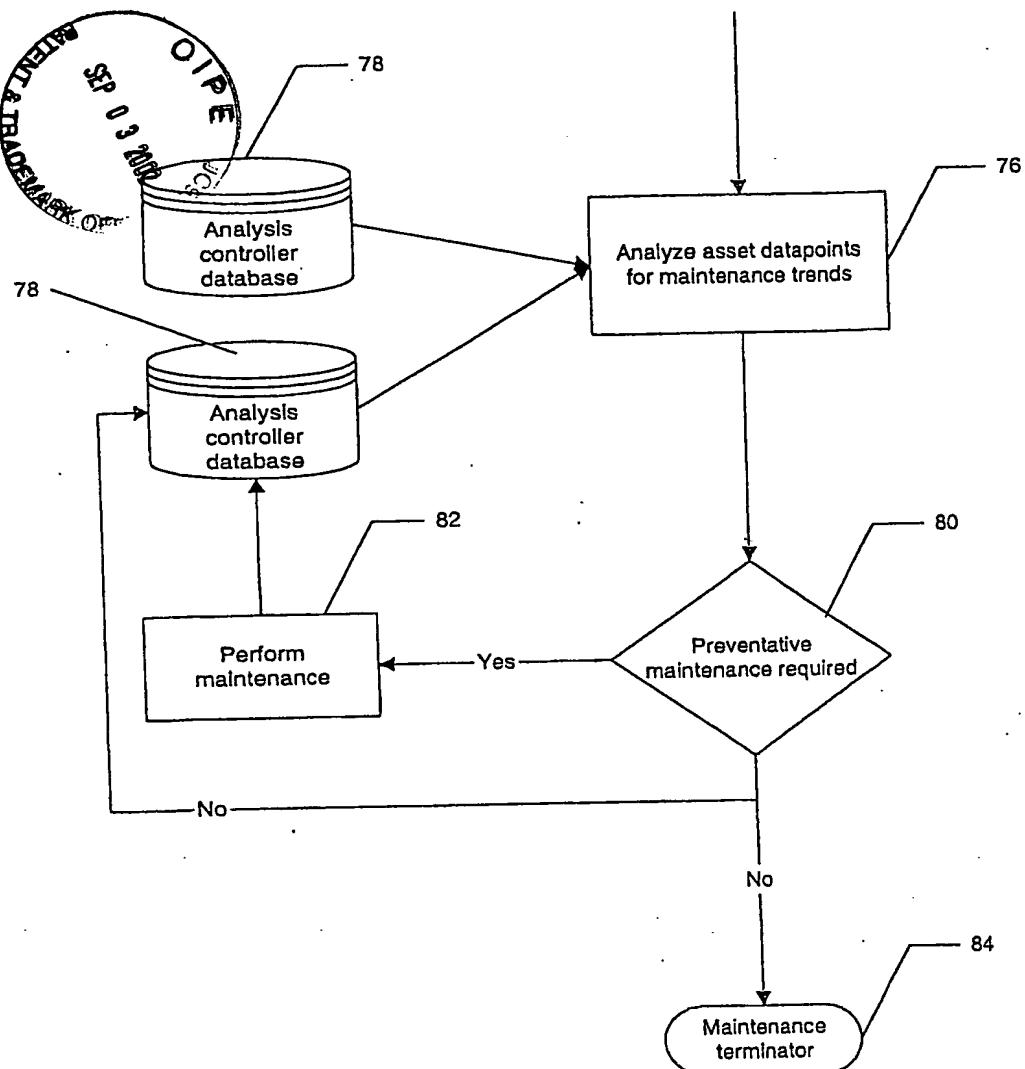


Fig. 4B



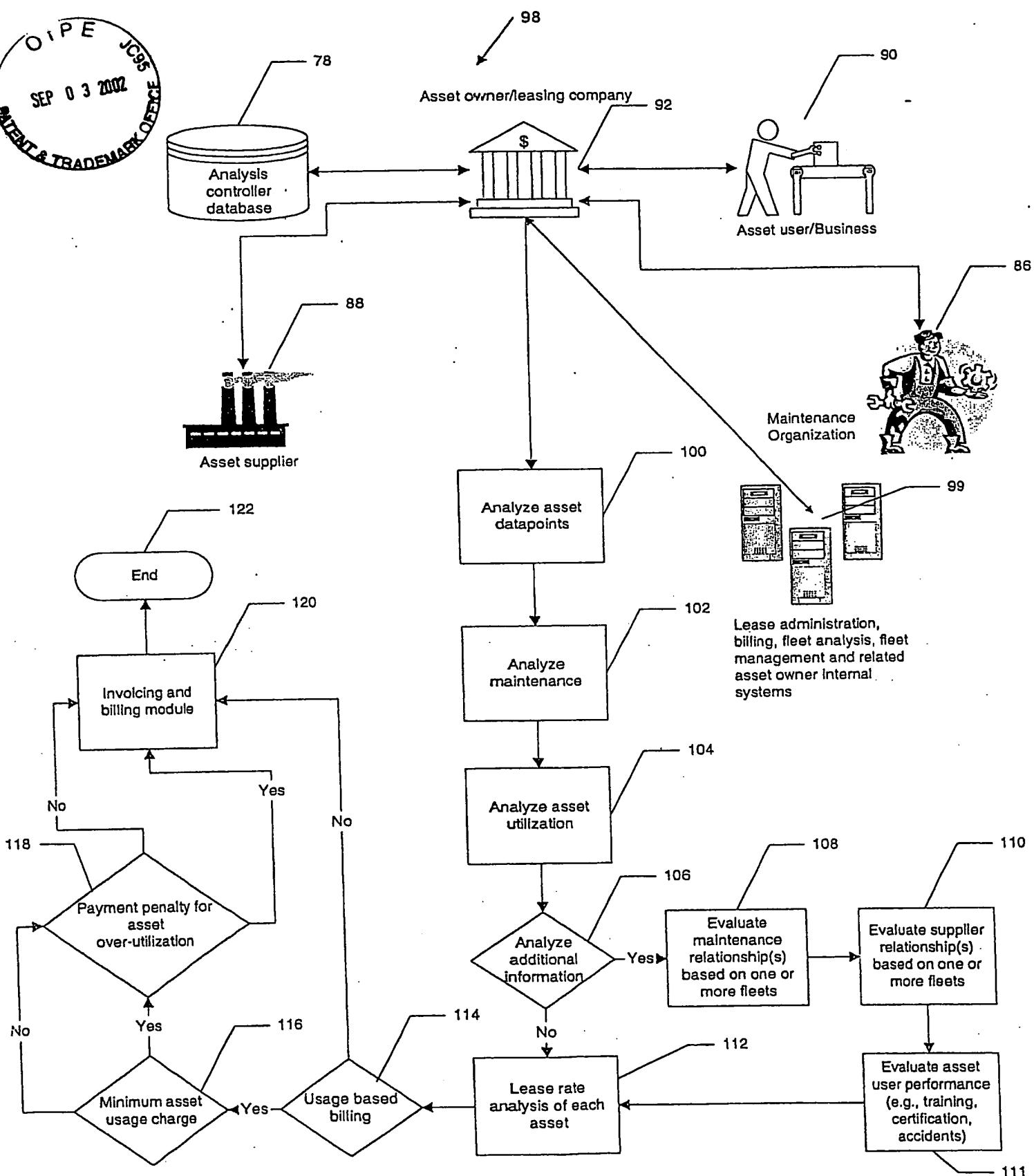
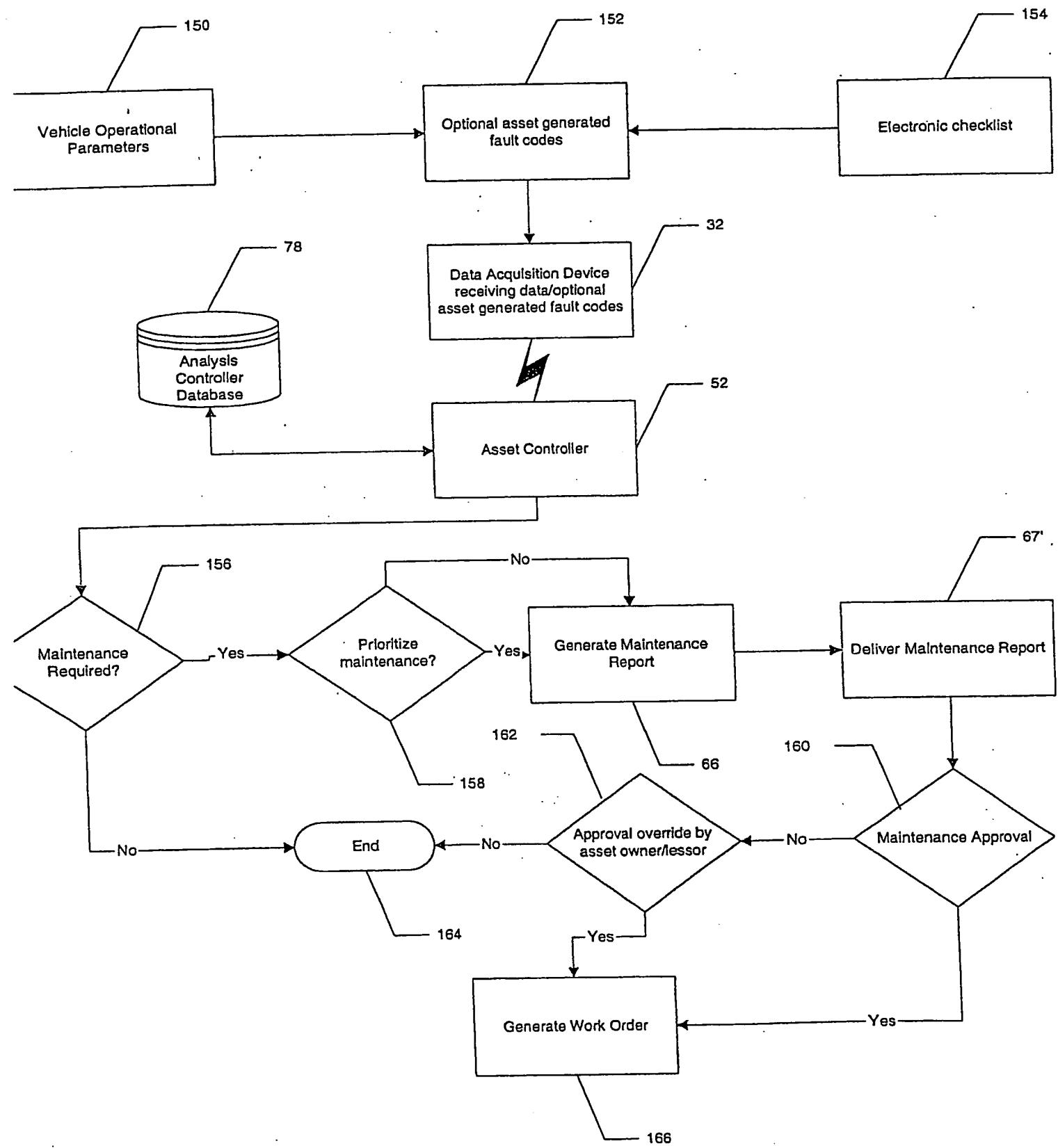


Fig. 6



Fig. 7



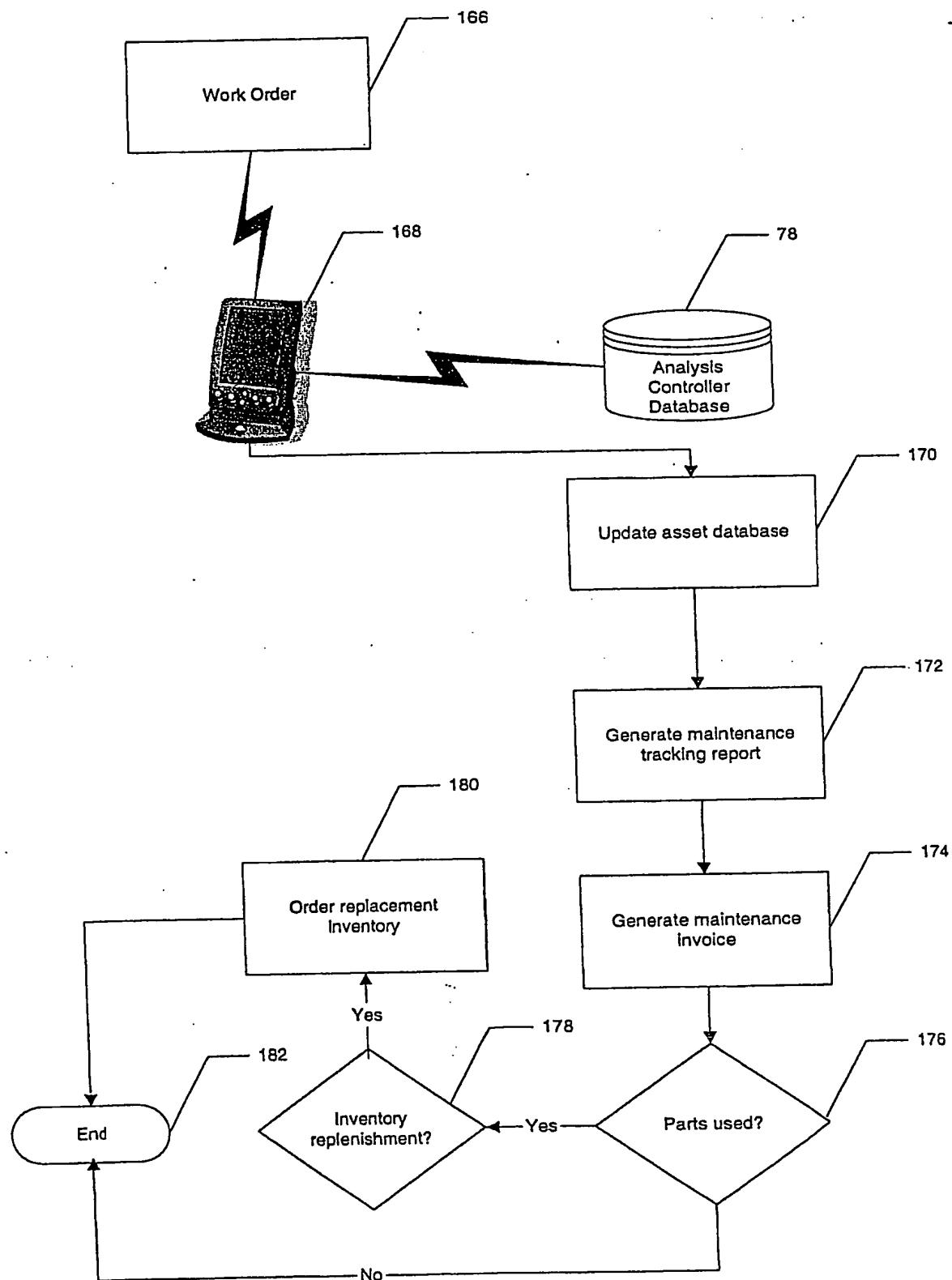
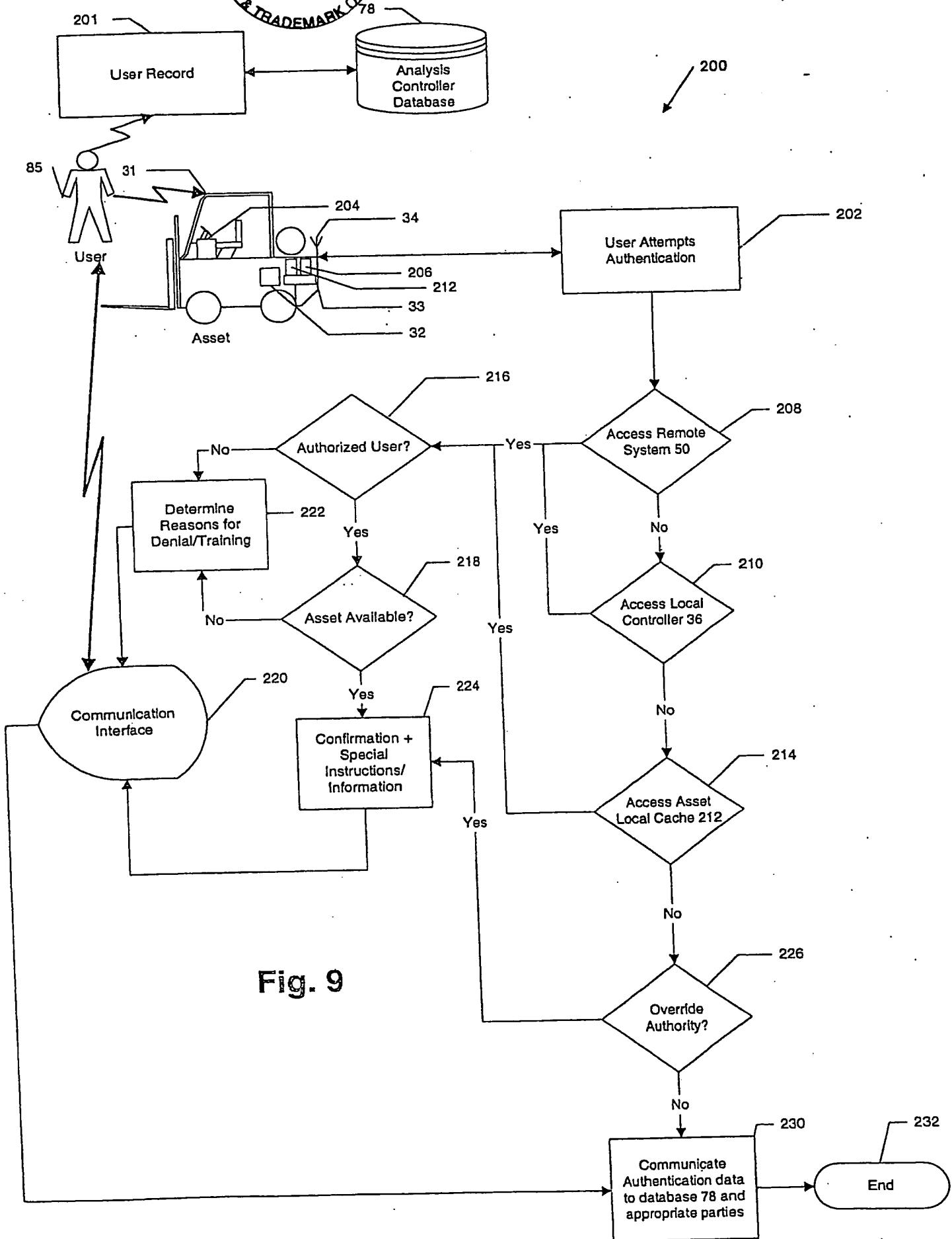


Fig. 8



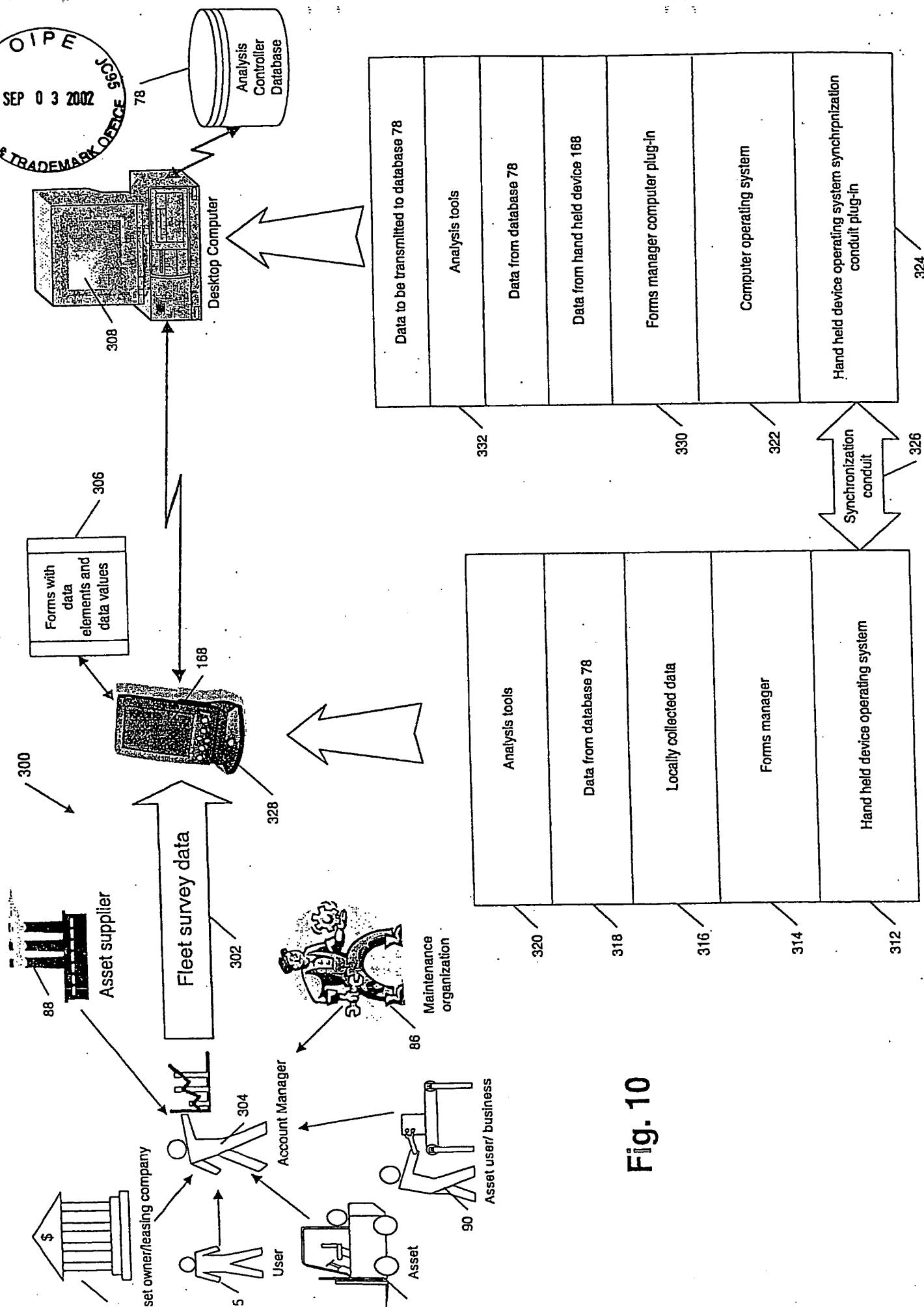


Fig. 10



Practitioner's Docket No. 65678-0042 (5672 DCCSP)

PATENT

COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,
CONTINUATION, OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is for an original application.

INVENTORSHIP IDENTIFICATION

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am an original, first and joint inventor of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

SYSTEM AND METHOD FOR DISPOSING OF ASSETS

SPECIFICATION IDENTIFICATION

I hereby authorize and request my attorney(s) of record in this application to insert the serial number and filing date of this application in the spaces that follow:

Serial Number: 09/990,911, Filing Date: 11/14/2001.

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56.

POWER OF ATTORNEY

I hereby appoint the following practitioner(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Michael B. Stewart

Registration Number 36,018

Robert M. Leonardi

Registration Number 27,815

Phillip A. Rotman II

Registration Number 38,290

I hereby appoint the practitioners associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

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Michael B. Stewart
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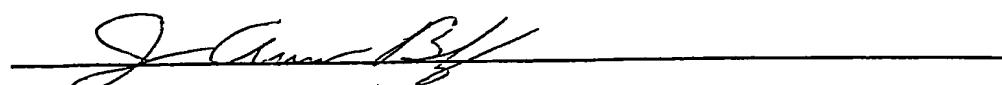
DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURES

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Inventor's signature



Date 10/31/01

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8022 EAGLE CREEK

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Brent Parent
Inventor's signature Brent Parent
Date _____ Country of Citizenship _____
Residence 247 Stone Oak Court, Holland, Ohio 43528

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ASSIGNMENT
(Joint Inventors)

WHEREAS, We, J. Aaron Bly residing at 2650 Pine Trace Drive, #4, Maumee, Ohio 43537, David T. Spieldenner residing at 204 Smith Road, Apt. A, Gibsonburg, Ohio 43431, Aaron Roth residing at 5923 Highlandview Drive, Sylvania, Ohio 43560, and Patrick O'Brien residing at 613 Midfield Drive, Maumee, Ohio 43537, Andrew F. Suhy, Jr. residing at 30 Avenue at Port Imperial #301, West New York, New Jersey 07093, and Brent Parent residing at 247 Stone Oak Court, Holland, Ohio 43528 (hereinafter referred to as Assignors) have invented new and useful improvements in:

SYSTEM AND METHOD FOR DISPOSING OF ASSETS

I hereby authorize and request my attorney(s) of record in this application to insert the serial number and filing date of this application in the spaces that follow:

Serial Number: _____, Filing Date: _____.

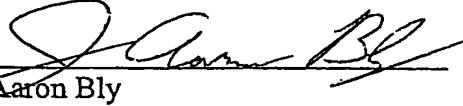
AND WHEREAS, Dana Commercial Credit Corporation (hereinafter referred to as Assignee), of 660 Beaver Creek Circle, Maumee, OH 43537, is desirous of acquiring the entire right, title and interest in and to said invention and said application for Letters Patent of the United States, and in and to any Letters Patent or Patents, United States or foreign, to be obtained therefor and thereon:

NOW, THEREFORE, be it known by all whom it may concern, that for and in consideration of One Dollar (\$1.00) and other good and valuable consideration, the receipt of which is hereby acknowledged, the Assignors have assigned, sold and set over, and by these present assigns, sells and sets over unto the Assignee, its successors, legal representatives and assigns, for the territory of the United States of America and all foreign countries, the entire right, title and interest in and to said invention, said application for Letters Patent, including the right to file foreign patent applications corresponding to said application, and the right to claim the priority date of said United States patent application and any legal equivalents thereof, and any and all Letters Patent or Patents in the United States of America and all foreign countries which may be granted therefor and thereon, and to any and all divisions, continuations, and continuations-in-part of said application, or re-issues or extensions of said Letters Patent or Patents prepared and executed by Assignor on even date herewith, the same to be held and enjoyed by the Assignee, as fully and entirely as the same would have been held by the Assignors had this Assignment and sale not been made.

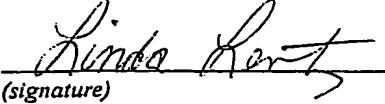
AND the Assignors hereby covenant and agree that the Assignors will at any time upon the request and at the expense of the Assignee execute and deliver any and all papers and do all lawful acts that may be necessary or desirable to perfect the title to said invention and to obtain Letters Patent therefor, and the Assignors hereby authorize and requests the Commissioner of Patents to issue said Letters Patent to the Assignee in accordance with this

Agreement.

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my seal at
Milwaukee, in the State of Ohio, this 31 day of October, 2001.
(city) (state) (date) (month)


J. Aaron Bly

WITNESSES:


(signature)

LINDA LENTZ
(printed name)

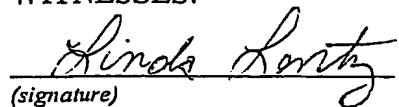

(signature)

Ellis B. Ramirez
(printed name)

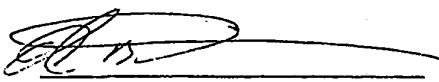
IN TESTIMONY WHEREOF, I hereunto set my hand and affix my seal at
Milwaukee, in the State of Ohio, this 31 day of October, 2001.
(city) (state) (date) (month)


David T. Spieldenner

WITNESSES:


(signature)

LINDA LENTZ
(printed name)


(signature)

Ellis B. Ramirez
(printed name)

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my seal at
Maumee, in the State of Ohio, this 31 day of October, 2001.
(city) (state) (date) (month)


Aaron Roth

WITNESSES:

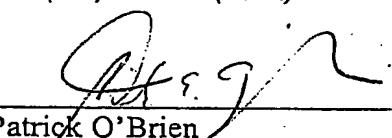
Linda Roth
(signature)

LINDA LENTZ
(printed name)

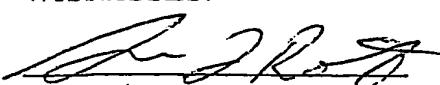

(signature)

Ellie B. Ramirez
(printed name)

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my seal at
Maumee, in the State of Ohio, this 9 day of November, 2001.
(city) (state) (date) (month)


Patrick O'Brien

WITNESSES:


(signature)

Aaron J. Roth
(printed name)

Linda Roth
(signature)

LINDA LENTZ
(printed name)

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my seal at
_____, in the State of _____, this _____ day of _____, 2001.
(city) (state) (date) (month)

Andrew F. Suhy, Jr.

WITNESSES:

(signature)

(printed name)

(signature)

(printed name)

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my seal at
_____, in the State of _____, this _____ day of _____, 2001.
(city) (state) (date) (month)

Brent Parent

WITNESSES:

(signature)

(printed name)

(signature)

(printed name)

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UNITED STATES PATENT AND TRADEMARK OFFICE

**Continuation-in-Part Patent Application for an invention entitled
SYSTEM AND METHOD FOR DISPOSING OF ASSETS**

By:

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Prepared by:

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Registration No. 36,018
Attorney Docket No.: 65678-0042
Customer No.: 010291
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39533 Woodward Avenue, Suite 140
Bloomfield Hills, Michigan 48304
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SYSTEM AND METHOD FOR DISPOSING OF ASSETS

RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Application
5 Serial No. 09/441,289 filed November 16, 1999, U.S. Provisional Application Serial No. 60/166,042 filed November 17, 1999, and U.S. Application Serial No. 09/503,671 filed February 14, 2000, and U.S. Application Serial No. 09/714,702 filed November 16, 2000, all applications hereby incorporated
10 by reference in their entirety.

Background of the Invention

1. Technical Field.

[0002] The present invention relates generally to an electronic
15 system and method for use in the field of asset management and electronic commerce.

2. Description of the Related Art.

[0003] The field of industrial equipment, such as forklifts,
20 includes business entities at several different levels, including manufacturers, dealers, third-party financiers, and end-user customers. In one common arrangement, the dealer maintains an inventory of a wide variety of equipment types for rental to its end-user customers (i.e., the dealer's
25 "rental fleet"). Some types of equipment in the dealer's rental fleet, however, are only infrequently needed by the dealer's end-user customers. Accordingly, such seldomly used items experience a reduced utilization rate compared to other items in the rental fleet. The dealer tolerates reduced
30 utilization on the seldomly used items for a number of reasons, including maintaining customer satisfaction, and, hopefully, not giving the customer a reason to "shop around" for a new dealer who may have larger inventory of seldomly

used pieces of equipment. Conventional methods of conducting business, particularly providing rental fleets, have obvious shortcomings, inasmuch as the full economic value of some items in the dealer's rental fleet cannot be realized.

5 [0004] Another common business arrangement involves a third-party financing company that buys pieces of industrial equipment from the manufacturer and then leases the equipment to the end-user customer. The customer then utilizes the industrial equipment (the customer's "fleet") in its business.

10 In some circumstance, the customer actively "manages" the fleet of industrial equipment, attending to repair and maintenance, the acquisition of replacement equipment, and the retirement of old or unproductive equipment from the fleet.

15 In other circumstances, however, the leasing company performs the asset management function. In either set of circumstances, challenges to be overcome by fleet managers include how to effectively and efficiently determine the timing, selection, and acquisition of replacement equipment, and the disposal of equipment being retired from the fleet or 20 coming to an end of the lease term.

25 [0005] Known approaches to deal with the foregoing challenges fall mostly into the use of manual methods. For example, determining whether to replace a poorly performing piece of equipment has typically been based on limited data relating to the equipment known by an experienced fleet manager.

30 [0006] Another approach known for asset management pertains to passenger vehicle fleets and involves a computer-based, Internet-enabled vehicle selector program. The vehicle selector program provides average values for a plurality of different operating parameters and vehicle types that may be of interest to a fleet manager considering vehicle replacement. These parameters may include average monthly maintenance cost, and average miles per gallon. While the

vehicle selector program provides at least some useful financial and performance information to the fleet manager, such a system fails to address the ultimate question fleet managers encounter: How does a change (i.e., an addition, or a 5 subtraction) in the configuration of my fleet effect its overall performance? The known vehicle selector program simply does not provide information as to how a combined fleet would perform.

[0007] Another challenge, particularly acute for third-party 10 financing companies, involves how to effectively and efficiently dispose of assets whose lease has ended, or will end in the near future. Conventional analysis approaches have been haphazard at best. They have included utilization of well-known auction systems, posting of off-lease equipment on 15 electronic bulletin boards and the like for sale purposes, as well as utilization of consignment networks. One key shortcoming of all these known systems of disposing of end-of-lease assets manifests itself in the failure to fully realize the full, remaining economic value of the asset. One factor 20 contributing to this shortcoming involves the lack of information available to potential purchasers, renters and lessees. Information concerning the condition, treatment, and, particularly, the maintenance history of the asset during its operating life up to the time the asset is being offered 25 for disposal are all important in determining a sales price, but are frequently unavailable. In any event, such information is never convenient to obtain. For example, it is known in the passenger vehicle fleet industry to make some level of maintenance history data on particular vehicle 30 available to the potential purchaser. However, to obtain this data, the potential purchaser must make a telephonic request to the asset's fleet manager, who manually looks up the information, and provides it (e.g., by way of facsimile) to

the potential purchaser if it is even available. Obtaining such information, therefore, involves a significant investment, both in time and effort. The investment is entirely lost if the purchase is not consummated, and is still 5 partially lost even if the asset is finally transferred. The time lag involved in obtaining the information also leads to undesirable inefficiency. For example, a purchaser may have to make a quick decision regarding whether or not to buy a first asset, which would preclude a lengthy investigation of a 10 second asset (e.g., the first asset may be sold by the time the investigation of the second asset has been completed). This is particularly inefficient if the second asset is a better "fit" for the purchaser than the first asset.

[0008] There is therefore a need for a system and method for 15 facilitating transactions, and for managing assets of a fleet, that minimizes or eliminates one or more of the types problems exemplified above.

Summary of the Invention

[0009] In one aspect of the present invention, an electronic 20 system is provided for facilitating transactions, particularly rental transactions. The electronic system provides, in-effect, a "virtual" rental fleet available to a user of the system, such as a dealer. The system includes an asset configuration unit, a market database, a market search module, 25 and a communications interface.

[0010] The configuration unit is responsive to input data provided by a first user of the system for generating a profile of an asset. The asset profile comprises asset specification data and a bid definition. In a preferred 30 embodiment the bid definition outlines parameters associated with a rental transaction of the asset. The market database is configured to store a plurality of asset profiles. The market search module is configured to search the market

database, based on search parameters specified by a second user, and generate an identification of assets. The bid module is configured to allow the second user to select one of the assets on which to bid. The bid module is also adapted to 5 provide rental options to the second user, based on the bid definition for the asset. Finally, the communications interface is configured for facilitating the electronic remote access by the second user of the system.

[0011] Through the foregoing, a dealer or the like is provided 10 access to a "virtual" rental fleet of assets, some of which are not owned or controlled by the dealer. The system allows a user, such as a dealer, to satisfy the requirements of the dealer's end-user customer without having to maintain infrequently used items in the dealer's own rental fleet 15 (which experience low utilization rates and thus return on investment.) Additionally, the electronic system also allows a user, such as a dealer, who has its own under-utilized assets to consign such assets for rental by third parties, thereby allowing an increased, effective utilization rate.

[0012] In another aspect of the present invention, an electronic 20 system is provided for facilitating transactions, including, for example, assets disposal. The system, according to this aspect of the present invention, provides detailed information concerning an asset including the maintenance history data so 25 that the user, a potential purchaser, rentee or lessee, may evaluate the asset. The system includes a first database, a market search module, and a communications interface.

[0013] In a preferred embodiment, the first database is 30 configured to store information associated with a plurality of assets, such as pieces of industrial equipment. The market search module is configured to search the first database, based on search parameters specified by the user in anticipation of at least one of a purchase, rental and lease

transaction. The market search module is also adapted to generate an identification of assets in accordance with the specified search parameters. At least one of the identified assets has a description that includes maintenance history data of the asset. The communications interface is configured to facilitate electronic remote access of the system by the user, which, in one embodiment, occurs over the Internet.

5 [0014] The electronic system, according to this aspect of the present invention, maximizes value extraction by making detailed information concerning the asset readily available to the user. In particular, the maintenance history of the asset constitutes information that may increase the price obtained for the asset. For example, the maintenance history data is particularly important to a dealer class of users of the system who anticipate sub-renting or sub-leasing the asset for a short term, inasmuch as a common commercial practice places the responsibility of maintenance on the dealer, not the end-user customer. Availability of information such as maintenance history data electronically, and immediately, substantially minimizes or eliminates the cost associated with information acquisition.

10

20 [0015] In a refinement of the proposed asset disposition, a subsystem is disclosed, which compares a subset of all assets within the inventive system with a series of pre-defined conditions to determine if an action needs to be taken with respect to asset disposition. If a pre-defined condition is met, the system provides a ranked hierarchy of options based on the pre-defined condition that has been met. Associated with each option is the cost of invoking it, and the reasons why it is recommended for consideration. The hierarchy of options and the option determination assumptions are optionally reviewed and then presented to the asset user for consideration.

25

30

[0016] In another aspect of the present invention, an electronic system for modeling a simulated fleet is provided. The capability to model a simulated or "fantasy" fleet of assets provides the user with an effective and efficient mechanism to 5 perform "what if" analyses. The user can then use the results to evaluate what effect proposed changes to an existing fleet would have on overall fleet performance. The electronic system for modeling a simulated fleet includes a simulated fleet configuration unit, a reporting and analysis module, and 10 a communications interface.

[0017] The simulated fleet configuration unit is provided for allowing a user to add a plurality of assets to the simulated fleet. Each asset is defined as having at least one parameter associated therewith. For example, in one embodiment, the 15 parameter may be a total hourly cost to operate the asset. The reporting and analysis module is configured to generate a report having a composite output value that corresponds to the parameter, and, is characteristic of all of the assets in the simulated fleet. For example, the composite output value may 20 be a composite total hourly cost for all the assets in the simulated fleet. Finally, the communications interface is configured to facilitate electronic remote access of the system by the user. For example, in a preferred embodiment, the communications interface allows access to the system over 25 the Internet. This reduces the time and effort to obtain information. The system, according to this aspect of the present invention, provides a more effective asset management tool than available using conventional systems.

[0018] In a preferred embodiment, some of the assets contained 30 in the simulated fleet correspond to assets already contained in the user's existing fleet. The remainder of the assets in the simulated fleet correspond to new or used assets proposed for acquisition by the user. The report generated by the

reporting and analysis module contains a composite output value representative of all the assets in a simulated fleet, namely, both the existing assets, and the proposed assets to be acquired. The report may be compared to a second report 5 generated based on the performance of the assets in the existing fleet alone. Comparison of the two reports by the user allows accurate evaluation of the impact of the proposed changes.

[0019] Other objects, features, and advantages of the present 10 invention will become apparent to one skilled in the art from the following detailed description and accompanying drawings illustrating features of this invention by way of example, but not by way of limitation.

15 Brief Description of the Drawings

[0020] Figure 1 is a simplified diagrammatic and block diagram view of a fleet management and electronic commerce system in accordance with the present invention;

20 [0021] Figure 2 is a simplified block diagram view illustrating functional modules according to the invention;

25 [0022] Figure 3 is a simplified diagrammatic view of a screen output of the system of Figure 1, including a link to further fleet information;

30 [0023] Figure 4 is a simplified diagrammatic view of a screen output of the system of Figure 1, showing detailed fleet information;

[0024] Figure 5 is a simplified flowchart diagram showing the steps for a method of adding an asset to a fleet;

[0025] Figure 6 is a simplified diagrammatic view of a screen output of the system of Figure 1, illustrating greater detail of a selected asset, including maintenance history data;

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[0026] Figure 7 is a simplified flowchart diagram illustrating the steps for a method of consigning an asset for sale, rental or lease;

10 [0027] Figure 8 is a simplified diagrammatic and block diagram view showing, in greater detail, the process for generating asset specification data and a bid definition;

15 [0028] Figure 9 is a simplified diagrammatic view of a screen output of a fleet search module of the present invention;

[0029] Figure 10 is a simplified diagrammatic view of a market search criteria input form;

20 [0030] Figure 11 is a simplified diagrammatic view of a screen output showing an identification of assets resulting from the market search;

25 [0031] Figure 12 is a simplified diagrammatic view of a screen output showing purchase, lease and rental options;

[0032] Figure 13 is a simplified diagrammatic view of a screen output showing assets contained in a simulated or "fantasy" fleet;

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[0033] Figure 14 is a simplified diagrammatic view of a screen output illustrating a report, including a composite financial parameter, for a simulated fleet;

5 [0034] Figure 15 is a simplified flowchart diagram illustrating the steps for comparing assets with pre-defined conditions and then providing ranked options based on the condition met with respect to asset disposition; and

10 [0035] Figure 16 is a simplified diagrammatic view of a screen output illustrating a report showing the status of asset disposition based on available options and their consideration.

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Detailed Description of the Preferred Embodiments

[0036] Referring now to the drawings wherein like reference numerals are used to identify identical components in the various views, Figure 1 is a simplified diagrammatic and block 20 diagram view showing an electronic system 20 for managing, tracking and conducting electronic commerce, with respect to a plurality of assets designated 221, ..., 22n. The assets 221, ..., 22n are illustrated as being a plurality of pieces of movable industrial equipment, such as a plurality of conventional forklifts or similar machinery, used in the manufacture of goods in a typical factory environment. It should be understood, however, that system 20 is configured 25 for operation with a wide variety of assets. System 20 is further configured to manage, and facilitate commercial transactions involving other assets (i.e., those not tracked) 30 that are consigned or otherwise made available on an electronic market established by system 20.

[0037] Before proceeding to a detailed description of system 20 keyed to the drawings, a general overview of the features of the present invention will be set forth.

[0038] Electronic system 20 overcomes a problem identified in the Background, namely, the inability of prior systems to significantly facilitate business transactions that could increase utilization of infrequently rented assets in a user's rental fleet. Electronic system 20 includes functionality that allows users, in-effect, to consign assets on an electronic market in a manner that makes detailed information, such as maintenance history, readily available. Through the foregoing, users of system 20 having under-utilized equipment may use system 20 to "post" such equipment on the electronic market for rental, lease, or the like by other users of the system. Not only does system 20 enable some users to increase utilization of under-utilized assets, other users, (e.g., dealers) who have an occasional need for some equipment (e.g., to provide to their end-user customers), can rent or lease equipment from the market in contemplation of sub-rental or sub-lease, without having to actually own the equipment. Detailed information, such as maintenance history data, allow users to make informed decisions. Equipment selection efficiency is significantly improved since it is commonplace for users such as dealers to be responsible for the maintenance of equipment they sub-rent. Well-maintained and problem free equipment will likely be in the highest demand, and draw the highest lease and rental rates.

[0039] Another shortcoming set forth in the Background involves the failure to realize an assets' full value upon disposal at the end of a lease term. Conventional systems are inefficient and inconvenient for making desired information available to new owners, lessees, and renters prior to their making decisions concerning such transactions. In accordance with

the present invention, electronic system 20 is configured for facilitating transactions by creating an electronic market. In particular, system 20 is configured to allow remotely located users to electronically search the market based on 5 search parameters they specify, and obtain a detailed description of the assets, including the maintenance history data. System 20 also includes a bidding mechanism configured to allow the user to bid on the assets. The contemplated transactions can be closed electronically.

10 [0040] As stated in the Background, one shortcoming of conventional asset management systems involves the absence of an electronic "what if" analysis tool. The present invention overcomes this shortcoming, enabling the creation of a simulated ("fantasy") fleet. A user of system 20 may add a 15 plurality of assets to the simulated fleet, including currently held or controlled assets in an existing fleet, such as assets 221, ..., 22n, as well as new and/or used assets available in a "market" portion of system 20. The simulated fleet analysis tool allows the user to evaluate proposed 20 changes to an existing fleet. The tool may be used to compute parameters of interest that are characteristic of all the assets contained in the simulated fleet, which can then be compared to the same parameters for the user's existing fleet.

[0041] Referring now to Figure 1, system 20 is configured for 25 electronic remote access by a plurality of remote users, designated 231, ..., 23n, through remote client computers 241, ..., 24n, over a global computer network, such as Internet 26. Private networks or dial-up connecting may also be used. Inasmuch as system 20 performs a variety of functions, such as 30 tracking and management of assets, as well as facilitating electronic commerce, the users 231, ..., 23n may fall into a plurality of user classes, which are accommodated within system 20.

[0042] With continued reference to Figure 1, remote client computers 241, ..., 24n may be any one of a plurality of well known computer systems, such as, for example, a personal computer (PC) running a Microsoft Windows operating system 5 (e.g., Windows 95, Windows 98, Windows NT Workstation, and Windows 2000), or a Macintosh computer (Apple Computer). When used with Internet 26, remote client computers 241, ..., 24n are preferably configured to include a conventionally, commercially available web browser, such as, for example, 10 Netscape Navigator 4.0 or higher, commercially available from Netscape Communications Corporation, or Microsoft Internet Explorer 4.0 or higher, commercially available from Microsoft Corporation, Redmond, Washington. The browser included on client computers 241, ..., 24n preferably includes the 15 capability of establishing a secure connection through Internet 26, by way of a firewall system 44 with web server 30, for example, using a Secure Sockets Layer (SSL) protocol described below. Of course, other mechanisms for establishing a secure connection, such as the S-HTTP protocol may be used 20 so long as both the client computers 24 and web server 30 are configured to include software compliant with the chosen protocol. Moreover, the present invention recognizes that different client software may be required when using private networks or a dial-up connection.

[0043] System 20 interfaces with a tracking and management system 28, and preferably includes a first computer system, such as a web server 30, a second computer system, such as an application server 32, and a third computer system, such as a database server 34. One or more of the servers may be 25 combined, depending on the size and complexity of system 20. Database server 34 is coupled to a market database 36 and a global asset database 38 comprising a fleet database 40 and a preconfigured asset database 42. In the client-server 30

architecture described herein, the "server" provides the information to the "clients". Electronic system 20 may further include, in an alternative embodiment, a firewall system 44.

5 [0044] Tracking and management system 28 is configured to automatically gather, analyze, and deliver information relating to the procurement and utilization of assets 221, ..., 22n, so as to maximize productivity and to reduce operating cost and administrative burdens. Each asset may be provided
10 with a data acquisition device for sensing and storing one or more operating characteristics associated with the asset. Such information can be transmitted to a receiver connected to a collection controller contained within system 28 for purposes of storing such information. System 28 may be
15 further configured to automatically update individual records associated with each of the assets with information received, including for example, maintenance history information, and hour-meter readings. System 28 is operatively coupled to electronic system 20, particularly database server 34, as
20 shown in Figure 1. This coupling allows system 20 to be updated with current information regarding the tracked assets 221, ..., 22n. Users 231, ..., 23n may then access and review the status of their fleets, over Internet 26, using system 20 as a gateway. Tracking and management system 28 may be a system
25 as described in co-pending application U.S. Serial No.: 09/441,289, filed 11/16/99 entitled "APPARATUS AND METHOD FOR TRACKING AND MANAGING PHYSICAL ASSETS", hereby incorporated by reference in its entirety.

[0045] Web server 30 operates as a communications interface for
30 facilitating electronic remote access of system 20 by users 231, ..., 23n via client computers 241, ..., 24n when using Internet 26. Web server 30 is preferably compatible with the ubiquitous HyperText Transfer Protocol (HTTP 1.1), and

includes the capability of establishing a secure connection with client computers 241, ..., 24n via, for example, the publicly available Secure Sockets Layer (SSL) protocol. Version 3.0 of the SSL protocol is commercially available from 5 Netscape Communications Corporation. Web server 30 may comprise suitable hardware configured to handle anticipated traffic (e.g., requests, responses) therethrough, and may further execute conventional, commercial software, such as Windows NT 4.0 operating system software running Microsoft 10 Internet Information Server (IIS 4.0) software, both commercially available from Microsoft, Redmond, Washington USA.

[0046] Application server 32 is configured for running components of system 20, described functionally below, as well 15 as serving reports. Application server 32 may comprise conventional, commercially available hardware, and include conventional, commercially available software such as Windows NT 4.0 operating system software, Microsoft Transaction Server 2.0 transaction server software, as well as a conventional, 20 commercially available reporting engine software, such as Power Builder or Crystal Reports.

[0047] Database server 34 is configured for executing all database serving within electronic system 20, and may comprise suitably adapted hardware selected, in part, on anticipated 25 traffic and data access response-time standards set for system 20. Database server 34 may include conventional, commercially available software, such as Windows NT 4.0 operating system software, and Microsoft SQL server 7.0 database server software, both from Microsoft, Redmond, Washington USA.

30 [0048] Web server 30, application server 32, and database server 34 define a multi-tiered computing environment configured to achieve and implement the functionality to be described in greater detail hereinafter. It should be understood that

alternate architectures may be employed, achieving the same functionality, yet remain within the spirit and scope of the present invention.

[0049] System 20 organizes asset information into several logical groups. Market database 36, shown diagrammatically in Figure 1, is configured for storing a plurality of asset profiles, associated with a corresponding plurality of assets, destined for disposal on an electronic market. Contemplated transaction types include sale, rental and lease. The asset profile includes two parts: asset specification data and a bid definition. The asset specification data includes a variety of details about the asset, as well as its maintenance history. The bid definition outlines the parameters associated with the above-described commercial transactions contemplated for the asset. Market database 36 is illustrated as a logically separate database, although it should be understood that market database 36, in alternative embodiments, may be implemented together on the same physical hardware as the global asset database 38. Market database 36 is configured for rapid retrieval of asset information, as desired to facilitate the electronic commerce functionality of electronic system 20.

[0050] Fleet database 40 is configured to store asset specification data for assets contained in fleets being managed by system 20. As used herein, "fleet" is a logical grouping or association of one or more assets, which may include assets 221 ,..., 22n being tracked and managed by system 28. A "fleet" may be either (i) a current fleet, or (ii) a simulated or "Fantasy" fleet. An existing fleet is a fleet containing assets under the control of a user, for example, through ownership or lease. A "Fantasy" fleet may contain (i) any assets in any of the user's existing fleets ("held assets"), (ii) new or used assets not held or controlled by

the user such as may be available for purchase, rental, or lease from third-parties via the market, or (iii) fictional assets having a predetermined usage, and performance profile, from the preconfigured asset database 42.

5 [0051] Preconfigured asset database 42 includes a plurality of asset specifications for various asset types. The asset specification includes values that may be a composite of a plurality of specific, actual assets of the same or similar type. For example, a model "A" forklift from a particular manufacturer may have an average monthly maintenance cost based on a long history of tracking the maintenance cost for model "A" forklifts. A preconfigured asset brings these composite values when added to a fleet.

10 [0052] Firewall system 44 is disposed between the connecting network such as Internet 26, which is generally considered "insecure", and the secure, private network on which servers 30, 32, and 34 reside and execute. Firewall system 44 may be implemented in software, hardware, or a combination of both. As is known generally, firewall system 44 is configured to 15 intercept messages destined for web server 30, or exiting therefrom, and to examine such messages, and block those that do not meet security criteria. Firewall system 44 enhances the security, and hence the integrity, of the electronic market established by the invention. Firewall system 44 may 20 comprise conventional devices and methodologies known to those of ordinary skill in the art.

25 [0053] Figure 2 is a block diagram view of the functional modules implemented on electronic system 20. Functional modules include a login or authentication module 46, a fleet module 48 comprising a simulated fleet module 50 and a current fleet module 52, a fleet search module 54, a market module 56 comprising a market search module 58 and a bid module 60, a

reporting and analysis module 62, and a bid definition module 64.

[0054] Login 46 provides authentication functions, principally through a user ID/password approach. In one embodiment, 5 electronic system 20 includes several classes of users: a guest class, a member class, and a dealer class. A guest is characterized as having no member privileges, but can view assets available in market database 36, as well as other public areas of electronic system 20. A member has an 10 enhanced set of privileges. A member may create an actual fleet, and/or a simulated fleet, may conduct searches of the assets contained in the members existing and/or simulated fleets, may search market database 36 and bid on selected assets, run reports and conduct analyses, as well as place 15 assets in market database 36 for disposal. A dealer has access to the features available to members, but in addition, has access to a set of dealer tools generally unavailable to members, as discussed further below. Finally, electronic system 20 provides for an administrative class of users having 20 heightened, administrative rights and privileges, for example to perform maintenance or reconfigure system 20.

[0055] Before new users can practically use system 20, they must register. Accordingly, associated with login module 46 is a registration module (not shown) that allows a new user to 25 register, typically as either a member, or a dealer. For registration activities and/or user profile changes, web server 30 and the corresponding client computer 24 communicate via a secure, encrypted connection, such as via the SSL encryption protocol.

30 [0056] Regarding existing users, login module 46 is configured to automatically log the user in upon detection of an auto-login "cookie". A "cookie" is a message that is given to a client (e.g., a web browser on a client computer 241, , 24n)

by a server (e.g., web server 30). Client computer 241 will cache the cookie, and store the cookie in a file on the client computer 241 if the cookie is a so-called "persistent" cookie. A part of the message is a description of the range of URLs (e.g., <http://www.ironrhino.com>) for which that cookie is valid, and a time period for which the cookie will persist. Any future HTTP requests by the client computer that fall within that URL range (e.g., <http://www.ironrhino.com>) and valid time period will include, with the HTTP request, the current value of the cookie to the server. In operation, electronic system 20 is configured to query a user 23 using a client computer 24 to determine whether the user wishes to save the user-login and password. If the user responds "YES", then electronic system 20, particularly web server 30, sends a cookie to the corresponding client computer 24, wherein the cookie is stored in a file. When the user subsequently accesses the URL from which the home page of system 20 are served, the browser portion of client computer 24 determines a match and will send the auto-login cookie, (containing login/password) to electronic system 20 for authentication purposes. Upon successful login, login module 46 directs the user (e.g., member or dealer) to the user's start page (best shown in Figure 3).

[0057] With continued reference to Figure 2, fleet module 48 is configured to allow members and dealers to add their current fleet information into electronic system 20 for reporting, tracking and analyzing by module 62. It should be understood that such activities provide much information regarding the status of the fleet, and upon which important business decisions can be based. Simulated fleet module 50 is configured to allow a user 23 to access, add, view, edit and delete assets in a simulated fleet. According to the invention, the "Fantasy fleet" feature allows accurate and

immediate "what if" analysis, unavailable through the use of conventional systems. Current fleet module 52 allows a member or dealer to access, add, view, edit, or delete assets in one or more existing/actual fleets associated with the registered 5 member or dealer.

[0058] Figure 3 shows a user's "start" page 66 generated by fleet module 48 after a successful login. Start page 66 includes a navigation pane, a search pane 70, a descriptive text pane 72, an advertising/promotions pane 74, an existing 10 fleet information pane 76, and a simulated or "fantasy" fleet information pane 78.

[0059] Navigation pane 68 includes, in the illustrated embodiment, a plurality of user-invoked (e.g., via "clicking" with a mouse or other pointing device) functions or operations 15 that enable efficient navigation through the various modules of electronic system 20. Navigation pane 68 includes a Home button 80, a Search button 82, a "My Fleet" button 84, a "Fleet Builder" button 86, a STORE button 88, a Library button 90, a Reporting button 92, and a FAQ (Frequently Asked 20 Questions) button 94. Wherever the user navigates to within system 20, navigation pane 68 will appear at the top of the screen.

[0060] The "Home" button directs system 20 to take the user back to an initial login/registration page, which is then displayed 25 on the user's client computer 24. Search button 82 invokes fleet search module 54, which is configured to search the user's fleets to identify assets based on user specified search criteria (e.g., make, model, and year of manufacture.). The "MY FLEET" button 84 invokes fleet module 48, taking the 30 user to the user's start page 66. The "FLEET BUILDER" button 86 invokes a fleet builder wizard to lead the user through the steps of creating a new fleet of actual assets, or a simulated fleet. The "STORE" button 88 invokes market module 56,

providing the user with access to conduct searches of market database 36 to identify assets for purchase, rental or lease. Library button 90 invokes a library module (not shown) that allows the user to visit the on-line library of system 20 for 5 access to downloadable documents. Reporting button 92 invokes reporting and analysis module 62 for obtaining reports containing analysis results for fleet assets or market items. FAQ button 94 invokes FAQ module (not shown), allowing the user to access questions and answers of interest to the users 10 of system 20.

[0061] Search pane 70 includes pull down menus for defining search parameters for conducting a search of either market database 36, or fleet database 40. The search is invoked, in an illustrated embodiment, by selecting (i.e., "clicking") on 15 a "Search" button 96.

[0062] The descriptive text pane 72 is configured to display predetermined text to the user, based on user interaction with electronic system 20. For example, descriptive text pane 72 may include information instructing the user as to the 20 organization of start page 66, and the available options, such as creating an actual fleet or a fantasy fleet.

[0063] Advertising/promotions pane 74 is configured to display advertising or promotions that may be available. For example, certain pieces of equipment may be on a "lease special", more 25 details of which may be found in the site "STORE" (i.e., via "clicking" on "STORE" button 88 on the user's start page).

[0064] Current fleet information pane 76 comprises the interface through which a user interacts with electronic system 20 to create an actual or a current fleet, and to edit or delete a 30 fleet. Fleet information pane 76 includes, in the illustrated embodiment, a "Create Fleet" button 98, an Edit button 100, a Delete button 102, a radio button 104, and a link 106.

Selecting (i.e., "clicking") on the "Create Fleet" button 98

causes fleet module 48 to create a new fleet record in fleet database 40. In one embodiment, the record includes a fleet name, and a location. Edit button 100, when selected by the user, invokes current fleet module 52, which is configured to 5 allow the user to edit the fleet name and/or location of the fleet selected by radio button 104. Note that in Figure 3, only one existing fleet (i.e., the "Denver Division") is illustrated; however, when two or more existing fleets are displayed, each have a corresponding radio button 104 10 associated therewith, and only one of the radio buttons may be selected at a time (i.e., is darkened). The fleet having a darkened radio button is the "selected" fleet for purposes of Edit button 100, and Delete button 102. Selecting the delete button 102 causes current fleet module 52 to delete the 15 selected fleet from database 40. In the fleet information pane 76, in the illustrated embodiment, each existing fleet under the heading "Fleet Name" is configured to operate as a link to another page generated by system 20, particularly current fleet module 52. This "linked" page provides an 20 identification of the assets contained in the fleet. The portion of the "linked" page that shows the asset identification is illustrated in Figure 4 (portions of the "page" have been omitted for clarity, like the Navigation pane 68, which has was already been shown in Figure 3). 25 [0065] With continued reference to Figure 3, Fantasy Fleet information pane 78 includes a "Create Fantasy Fleet" button 108, an Edit button 110, a Delete button 112, a radio button 114, and a link 116. Pane 78, and buttons 108, 110, 112, 114, and link 116 operate in a substantially identical fashion to 30 pane 76, buttons 98, 100, 102, 104, and link 106, as described above, except that they pertain to the Fantasy Fleets. [0066] Figure 4 shows a screen output current fleet module 52, responsive to a user's selection of link 106 in Figure 3.

Figure 4 includes an identification of the individual assets included in the "Denver Division" fleet. In an illustrated embodiment, the identification includes a listing of the following parameters for each asset: a serial number, a make, 5 a model, a capacity (pounds), an asset type, an application rating, a usage parameter, a utilization parameter (percent), and a cost/hour (U.S. Dollars).

[0067] The view illustrated in Figure 4 includes an "Add Asset" button 118, an "Add Fleet Charge" button 120, an Edit button 10 122, a Delete button 124, a plurality of radio buttons 126, a Move button 128, a pull down menu 130 including entries 1301, 1302, ..., 130n, and a link 132. The "Add Asset" button 118, when selected by the user, causes current fleet module 52 to add assets to the selected fleet. This process will be 15 described in greater detail below. The "Add Fleet Charge" button 120, when selected, causes a charge (i.e., monetary charge) to be applied pro-rata to each of the assets included in the selected fleet. Edit button 122, and Delete button 124, when selected by the user, respectively, cause current 20 fleet module 52 to allow the user to edit, or delete an asset from the selected fleet. Which asset is affected is determined by which radio button 126 is selected. The edit function allows the user to edit the asset specification data associated with the asset. The "Move" button 128, when 25 selected by the user, moves an asset (as selected by the radio button 126), from the current fleet to the fleet chosen by the user from one of the entries 1301, 1302, ..., 130n in pull down menu which are actual fleets as well as to thereby move real, existing assets between existing fleets.

[0068] Figure 5 is a simplified flowchart diagram illustrating 30 the steps for a method of adding an asset to a fleet. The method begins in step 134. The "Add Asset" function may be invoked from either simulated fleet module 50 or current fleet

module 52. The description of Figure 5 will be made with reference to module 52, although it should be understood that module 50 could be executing the steps as well.

[0069] In step 136, current fleet module 52 obtains basic asset specification data responsive to input data provided by user 23. While the particular types of information contained in the asset specification data will vary depending on the particular asset type involved, in the illustrated embodiment where the asset comprises an industrial piece of equipment, namely a forklift, the asset specification data is divided into four subgroups: "basic", "additional", "usage", and "performance". In one embodiment, the "basic" asset specification data may include an asset type (e.g., a standard forklift), a make/model designation, a serial number, a year of manufacture, a capacity (e.g., in pounds), and commentary text. In a constructed embodiment, "clicking" the "Add Asset" button causes a dialog box to be presented to the user having four tabs labeled "basic", "additional", "usage" and "performance". The user moves from tab to tab, filling out respective forms, comprising input boxes and pull down menus. When complete, the user "clicks" on a "SAVE" link. The method then proceeds to step 138.

[0070] In step 138, module 52 obtains "additional" asset specification data, which in the illustrated embodiment of a forklift may include a mast type (e.g., quad, standard, STD, TSU, etc.), a tire type (e.g., cushion, foam filled, non-marking, pneumatic, polyurethane, etc.), a "fuel type", a mast height, a tilt selection, an attachment description, an asset description, a condition, and an accounting system asset identification (ID) number, and a lease ID number. As will be described below, reporting and analysis module 62 generates reports that include financial parameters, on both a per-asset and a per-fleet basis (e.g., average monthly cost). Part of

the cost analysis derives from how much is paid monthly to lease or rent the asset. This cost information, in one embodiment, is derived from information found in a separate accounting/leasing system (not shown), and is identified and 5 retrieved by electronic system 20 using the accounting system asset ID number, and lease ID number, provided as "additional" asset specification data in step 138. In an alternate embodiment, where the asset being added is not an asset covered under a lease in a leasing system in electronic 10 communication with system 20, further financial-option information will be obtained from the user for the asset being added, which may include a purchase price (including applicable depreciation information so as to enable calculation of a monthly cost amount), a lease/rental amount, 15 a lease-life rental-term, and a residual amount for lease/rent. The method then proceeds to step 140.

[0071] In step 140, current fleet module 52 obtains "usage" asset specification data, which may comprise the following: an acquired-from name (i.e., name), an application rating (e.g., 20 light, medium, heavy), a date in service, an active asset designation (i.e., yes or no), a number of shifts used, an original cost per hour, an original usage, an original utilization, as well as other features. The method then proceeds to step 142.

25 [0072] In step 142, current fleet module 52 obtains "performance" asset specification data comprising an original hour meter reading, a number of warranty months, a number of warranty hours, a date warranted, a date warranty removed, an original equipment cost, a list price, a preventative 30 maintenance (PM) hours specification, and a burden labor rate. It should be appreciated that the original hour meter reading provided to system 20 in step 142 has a date associated therewith. The meter reading and date form a data pair.

Future service events on the asset will generally also include further meter readings, such that the fleet database will have a plurality of date/meter-reading data pairs, each having a different date attached to it, for the life of the asset.

5 [0073] When the user completes the entry of the asset specification data, the user will be prompted to enter maintenance history data for the asset being configured. As shown in decision block 144, current fleet module 52 determines, through a suitable prompt to the user, whether 10 further maintenance history data is available. If the answer is "YES", then the method branches to step 146.

[0074] In step 146, current fleet module 52 obtains the next item of maintenance history data for the asset being configured. Maintenance history data may include the job date, a description of the problem (e.g., work-related, abuse, breakdown, regular maintenance) for which maintenance was required, a diagnosis, a commentary, a description of the actual work performed, the name of the vendor performing the work (if applicable), whether the maintenance source is 20 internal/external, whether covered under warranty, a description of the part replaced, a length of service, and an hour meter reading (usage). Financial parameters for the maintenance items obtained from the user may include: Invoice Number, Invoice Date, Invoice Due Date, Invoice Paid Date, 25 Total Cost, Labor Rate, Parts Tax, Labor Tax, Labor Hours, whether the item is Taxable, Exchange Rate, and Exchange Date. Financial parameter values for maintenance items may be used to determine total maintenance cost, and average maintenance cost for the asset. The method then loops back to decision 30 element 144. If the answer to decision element 144 is "NO", then the method branches to step 148.

[0075] In step 148, the asset specification data, including maintenance history data, for the asset being configured is

stored in fleet database 40. The method then proceeds to step 150, where the "add asset" portion of the current fleet module 52 ends.

[0076] The process for adding an asset to a "Fantasy Fleet", 5 although not shown specifically, is the same as outlined above for adding an asset to a current fleet, except that fleet module 48 invokes simulated fleet module 50, rather than current fleet module 52.

[0077] Figure 6 shows a screen output generated by current fleet 10 module 52 for a configured asset. The configured asset comprises asset specification data 154 including maintenance history data 156. In the example illustrated in the drawing, the user reaches the screen of Figure 6 by "clicking" on link 132 in Figure 4. Through the foregoing, a user wishing basic 15 information (i.e., a simple identification) of the assets in the user's fleet need proceed no further than Figure 4. However, for greater detail, including a description of the asset, the user can "drill down" by clicking on link 132 to reach Figure 6. Screen output 152 further illustrates an "Add 20 Maintenance Item" button 158, an Edit button 160, a Delete button 162, a plurality of radio buttons 164 and links 166, and 167.

[0078] For assets being tracked and managed by way of system 28, 25 maintenance history items, such as those illustrated as "Preventive Maintenance" and "Steering Mechanism", are automatically entered and available to electronic system 20 through an information transfer, from a tracking system 28. For assets not tracked by system 28, such data is input to system 20 through "front-end" entry by the user (e.g., 30 selecting the "Add Maintenance Item" button 158).

[0079] The Edit button 160, and the Delete button 162, when selected by the user, cause current fleet module 52 to allow the user to either edit, or delete, respectively, the

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maintenance item selected via one of the radio buttons 164. The foregoing availability of asset specification data, including maintenance history data, enhances real time management of assets in a fleet (e.g., provides the ability to 5 identify high maintenance items).

[0080] The user, by selecting or "clicking" on link 166, is provided with even greater detail for a selected maintenance item, for example, the item captioned "Preventive Maintenance". Selecting link 167 causes current fleet module 10 52 to retrieve an image of the selected asset. Other features may be provided in the asset description shown in Figure 6, including links to asset specification information provided by the manufacturer, user manuals, repair manuals, and many other types of information that may be useful concerning the asset.

Virtual Rental Fleet

[0081] Referring now to Figure 7, in accordance with the present invention, electronic system 20 is configured to facilitate 5 transactions where a first user, such as a dealer, can consign assets, such as forklifts, to the electronic market established by system 20 for sale, rental, or lease. This feature allows the first user, such as the dealer, to increase asset utilization by exposure of the asset to a broader 10 audience than just the end-user customers of that dealer.

Additionally, by making assets available that a second user/dealer can rent, with a view towards sub-renting to an end-user customer, electronic system 20 in-effect provides a "virtual" rental fleet. The rental fleet is "virtual" because 15 electronic system 20 enables the second user/dealer to provide equipment to his end-user customer that he does not own.

[0082] Significantly, the availability of maintenance history data for an asset allows the second user/dealer to make a better-informed decision before renting the asset. In the 20 rent/sub-rent scenario this is particularly important since the second user/dealer is typically responsible for the ongoing maintenance and service of the asset during the sub-rental term (i.e., the end-user customer typically does not pickup this responsibility during the sub-rental term).

[0083] Referring to Figure 7, a method of consigning an asset 25 for sale, rental or lease on an electronic market includes several steps. These method steps will be described briefly as an initial matter, then in greater detail in-turn.

[0084] Step 168 involves generating asset specification data 30 including maintenance history data from input data provided by a first user.

[0085] Step 170 involves generating a bid definition from further input data from the first user.

[0086] Step 172 involves storing the asset specification data and the bid definition together in an asset profile in market 5 database 36.

[0087] Step 174 involves searching, market database 36 based on criteria specified by a second user and displaying the asset profile.

[0088] Step 176 involves receiving a selection of an asset from 10 the second user for placement of a bid.

[0089] Step 178 involves providing, to the second user, one or more of a purchase, rental or lease options, in accordance with the bid definition. Step 178 also includes receiving a bid on the asset from the second user, based on the 15 transaction options.

[0090] Step 180 involves receiving an acceptance of the bid from the first user. Once the bid has been accepted by the first user (i.e., the party "posting" the asset on the electronic market), bid module 60 operates to close the transaction 20 contemplated by the bid.

[0091] Figure 8 provides greater detail of generating step 168 (producing asset specification data) and generating step 170 (producing bid definition). In particular, Figure 8 graphically shows in block form an asset profile 182 comprising asset specification data 154, and a bid definition 25 184. Referring to the upper half of Figure 8, asset specification data 154 includes a plurality of field values, including maintenance history data 156. Maintenance history data 156, in turn, comprises at least a date parameter 186, 30 and an action 188 may be any of the information referred to above regarding the maintenance item. In the illustrated embodiment, generating the asset specification data may be

performed by executing the "add asset" method described and illustrated in connection with Figure 5.

[0092] Bid definition 184 defines the parameters associated with the asset being consigned for sale, rental or lease to the 5 electronic market created by system 20. The bid definition 184 defines the bounds of the sale, rental or lease transaction involving the asset. Bid definition module 64 (best shown in Figure 2) is configured to generate the bid definition 184 as follows. In one embodiment, bid definition module 64, when invoked by the user, prompts the user for a 10 bid date 190, an availability date 192, and information defining the classes of users allowed to bid on the asset 194. The bid date 190 establishes the date when the asset is available for other users to bid on. The availability date 15 192 defines the date when the asset can be delivered.

[0093] Classes of users 194 include a dealer class 196, and a member class 198. With respect to dealer class 196, a logical variable 200 is associated therewith, and may take either of the values "Y", indicating that dealers are allowed to bid on 20 the asset, or "N", indicating that the dealers are not allowed to bid on the asset. As illustrated, logical variable 200 is a "Y", indicating that dealers may bid on the asset. Likewise, with respect to member class 198, a logical variable 202 is provided, and may also assume one of the values "Y" or 25 "N". In the illustrated embodiment, users who are in the member class may also bid on the asset. It should be understood that other logical arrangements, such as the use of a logical "0" or logical "1" could also be used, being an equivalent thereof.

[0094] Bid definition 184 also includes, for each class of 30 users, an identification of which of a sale, rental, or lease transaction is available to that class of user. As shown in Figure 8, all three of a buy option 204, a lease option 206,

and a rental option 208 are enabled for both classes of users (e.g., members and dealers). This is shown by a logical variable 210, (which are all set to "Y"). For each transaction type available to a user class, respective 5 transaction characteristic data is obtained from the first user. For example, the transaction characteristic data for a sales transaction includes a list sales price, such as shown in column 214, and a minimum sales price that a second user (e.g., another dealer) must submit to define a valid bid, such 10 as shown in column 212. The transaction characteristic data for a rental transaction includes a list rental price for a predetermined period of time (e.g., a month), and a minimum rental price for that predetermined period of time that the second user must submit in order to define a valid bid.

15 Finally, the transaction characteristic data for a lease transaction includes a total lease amount, and a term.

[0095] In a constructed embodiment, the bid definition module 64 executes a bid definition wizard. The information obtained from the first user to populate the fields described above is 20 obtained through a step-by-step process, which leads the user along, allowing the user to click on checkboxes to select the classes of users who will be allowed to bid, as well as what respective transactions will be available to that class of user. In addition, the bid definition wizard, as executed by 25 bid definition module 64, allows direct entry of dates, and pricing, where appropriate.

[0096] Bid definition module 64 is also configured for storing the asset specification data and the bid definition in an asset profile in a market database 36 when all the needed bid 30 definition information has been collected. This is shown in Figure 8 by a double arrowhead line to database 36.

[0097] Having described what bid definition 184 is, and how bid definition module 64 operates to obtain such information, a

description of the user's interaction with system 20 will now be set forth. To promote the greatest amount of flexibility for the user, electronic system 20 includes an asset configuration unit for preparing assets for posting and 5 consignment. The asset configuration unit obtains the asset specification data and bid definition to form the asset profile, and comprises multiple interfaces/modules. These interfaces/modules include a create and define feature of market module 56, a sequence of the add-asset feature of fleet 10 module 48 and the add-to-market feature of fleet search module 54, and the add-to-market feature of fleet search module 54 (for existing assets and shown in Figure 2). These three approaches will be described in detail in-turn.

[0098] First, in a create and define feature, the asset 15 specification data (including maintenance history data), as well as the bid definition are made by the first user directly out of market module 56. That is, when a first user, such as a dealer, wishes to post a piece of equipment on the electronic market, the first user, after logging in, initially 20 selects the "STORE" button 88 (Figure 3) from the user's start page 66, which invokes market module 56. Market module 56, as one of its available functions, would directly allow 25 configuration of an asset (i.e., input of asset specification data including maintenance history data, as well as the bid definition). When completed, the asset is stored in the market database.

[0099] Second, if the user wishes to post an asset on the 30 electronic market, but the asset does not presently "electrically" exist in one of the user's fleets, then the user can follow the "add asset" process described above in connection with Figure 5. Once the asset is created "electrically", the user then "clicks" the "Add to Market" button.

[00100] Third, existing assets may be configured for posting as follows. A user, for example a dealer, who wishes to post the existing asset in market database 36, would invoke the fleet search module 54 by selecting the Search button 82. 5 found on start page 66 (Figure 3). Figure 9 illustrates a search form that allows the user to search the user's fleets to identify assets based on specified search criteria. An identification of assets satisfying the criteria is returned by fleet search module 54. The user then selects the asset to 10 be placed on the market. As shown in Figure 9, this selection is done by selecting one of the radio buttons adjacent the desired asset, and then "clicking" the "Add to Market" button 215. Since the asset specification data for the selected asset is already stored in the fleet database 40, only bid 15 definition 184 need be generated for the asset to prepare it for posting. "Clicking" on the "Add to Market" button 215 invokes the bid definition wizard, described above in connection with Figure 8.

[00101] Through the foregoing functionality, electronic 20 system 20 allows a user, such as a dealer, to consign an asset to an electronic market for rental, lease, and/or sale by a second user, such as another dealer. This functionality enables the first dealer to increase utilization of infrequently used pieces of equipment by making those pieces 25 of equipment available to a larger audience of dealers and end-user customers. In addition, the second dealer realizes an increased virtual inventory of equipment from which to, preferably, rent (with a view towards sub-renting to an end-user customer).

30 [00102] In an alternative use of system 20, a non-dealer user of system 20, for example, an equipment leasing company, may purchase infrequently used equipment, for example, and make such equipment available through market database 36. The

universe of dealers (with the dealers sub-renting the equipment to end-user customers) and end-users may have a sufficiently high aggregate need for such piece of equipment to justify the purchase and ongoing rental to third parties.

5 In this embodiment, the end-user customer need not be aware of the actual ownership of the equipment, and will look to the dealer for service, maintenance and the like.

End-of-Lease Disposal

10

[00103] A particular business type of user who may take particular advantage of electronic system 20 is one engaged in the business of financing the capital requirements of other companies. For example, such financing may involve the lease or rental of forklifts 221, ..., 22n to the company who actually uses the forklifts in its business, and who pays a lease or rental fee. This type of user often has a large number of leases that may represent literally thousands of individual assets that are or will periodically be coming off of lease. Since this type of user has no direct use for such assets, such assets must be disposed of in an effective manner. The assignee of the present invention has determined that the information acquired during the tracking and management of the asset while the asset was being leased can be leveraged into a value proposition when such asset comes off of lease and must be disposed of. In particular, the assignee of the present invention has determined that keeping maintenance history data associated with assets on lease becomes a value-added feature when disposing of the asset in a fashion to be described in detail now.

[00104] Figure 10 shows a market-search parameter input form 216 generated by market search module 58 configured to allow a search of market database 36. Assets that have been tracked

and managed by tracking and management system 28 over an operating life (or portion thereof) have associated therewith a substantial amount of valuable information, including maintenance history data. When such assets come off of lease, 5 the particular type of user described above (i.e., lessor) transfers these assets into market database 36. Each asset in market database 36 has an associated asset profile comprising both asset specification data (including maintenance history data) and a bid definition. Accordingly, since these end-of- 10 lease assets already have the asset specification data defined, only a bid definition needs to be created. Completing the bid definition may be done manually for each asset, or may be automated through the use of a knowledgebase developed over time. Once the asset profiles for the end-of- 15 lease assets are stored in market database 36, then the other users of electronic system 20 will be able to electronically search the market database, based on search parameters they specify, in anticipation of a purchase, rental or lease transaction.

20 [00105] Referring to Figure 10, once such a user invokes market search module 58, search parameter input form 216 is displayed. Included in display 216 is a series of radio buttons: a lease radio button 218, a buy radio button 220, a rent radio button 222, and an "All" radio button 224. As 25 illustrated, the lease radio button 218 has been selected; accordingly, all assets in market database 36 that are available for lease, and satisfy the other search parameters, will be identified and returned in an output display, shown in Figure 11. It should be understood that the search results 30 may be further limited based on the other search parameters like the class of user conducting the market search (e.g., whether the user is a "member" or "dealer", and whether a particular asset has been configured to be bid on by a

"member" or "dealer"). Selecting the "All" radio button 224 results in a search that identifies all assets (i.e., not limited to any one transaction type). Figure 10 also shows that a market search may be limited by a lower list price 226, 5 an upper list price 228, as well as a plurality of further parameters, such as asset type, make/model, condition, year of manufacture, and availability date, as also illustrated. Once the user has defined the search, the market search is invoked by "clicking" the Search button 230.

10 [00106] Figure 11 shows a screen output 232 of market search module 58. Output 232 includes an identification 234 of the assets satisfying the search parameters. In the illustrated embodiment, identification 234 includes a date available parameter, an asset description parameter, a make and model 15 parameter, a capacity parameter, a year of manufacture parameter, a usage rating parameter, and a status parameter. The status data in the status parameter column, if any, is indicative of whether or not the asset has been sold. As shown in Figure 11, status data 235 for the "Allegany Mega-8" 20 asset indicates that it has been sold. Importantly, each asset, in an illustrated embodiment, is linked to a respective description, detailed in nature and which includes information beyond that contained in the simple identification. A user can "click" on the "Allegany Mega-8" wording that is 25 underlined, and will be hyper-linked to its detailed description. Although not shown in Figure 11, the detailed description of an asset may be substantially identical to the information illustrated in Figure 6.

[00107] Screen output 232 further includes a Bid button 236, 30 a plurality of radio selection buttons 238, a "New Search" button 240, and an "Add to Fantasy Fleet" button 242 having an associated pull down menu 244. Bid module 60 is configured to allow the user to select one of the assets identified in the

market search for placement of a bid. To place a bid on an asset, the user first selects the asset using the radio buttons 238. Thereafter, the user "clicks" on Bid button 236, which invokes bid module 60. The Move or Add to fantasy fleet 5 button 242 will be described in greater detail below in connection with the simulated fleet feature of the present invention.

[00108] Figure 12 shows a screen output 245 generated by bid module 60. In a constructed embodiment, output 245 includes 10 the detailed description of the asset, similar to Figure 6, but which has been omitted from Figure 12 for clarity. Bid module 60 provides transaction options: a purchase transaction option 246, a lease transaction option 248, and a rental transaction option 250. The desired transaction is selected 15 by the user through the radio buttons. In the illustrated embodiment, a "Buy" transaction has been selected by the user.

[00109] When the selected transaction is a purchase transaction, bid module 60 is configured to prompt the user 20 for a bid price offered for the selected asset, which is entered in input box 252. As used herein, the wording "prompt" merely means to provide a mechanism or means to accept the bid price, and does not suggest or require some active activity, such as a blinking input box, input wizard or the like.

[00110] When the selected transaction is a lease 25 transaction, bid module 60 is further configured to prompt the user to select a lease term, a lease type, and a monthly lease amount offered for the selected asset. As illustrated in exemplary fashion in Figure 12, the lease term may be input 30 through a pull down menu 254, the lease type may be input through pull down menu 256, and the monthly lease amount may be entered (e.g., keyboard) in box 258. In a constructed embodiment, the lease term may be one of a 24-month, 36 month,

48 month, 60 month, and 72 month term. Further, in a constructed embodiment, the lease type may be one of a category 1, category 2, category 3, fixed-ten (10%) percent, fixed-twenty percent (20%), buyout-new, buyout-used, category 5 4, category 5, category 6, and category 7 type leases. Lease types may be totally configurable. Of course, other options may be used or offered to the user, depending on the asset, market conditions, etc. To facilitate the bidding process, bid module 60 further includes a lease calculator tool, which 10 may be invoked by "clicking" on the Lease Calculator button 262. The lease calculator tool allows the user to specify lease term and lease type, and enter a third parameter, either a monthly payment or a total lease amount, and have the lease calculator calculate a fourth parameter, the other one of the 15 lease amount and monthly payment. The calculated amount can be directly transferred to the monthly lease amount box 258.

[00111] When the selected transaction is a rental transaction, bid module 60 is further configured to prompt the user for a monthly rental price offered for the selected 20 asset, which may be entered in box 260. The user may submit the bid by "clicking" on the "Submit Bid" button 264.

[00112] Bid module 60 is further configured to generate a bid history (not shown) for each asset that has been posted in market database 36. The bid history comprises a listing of 25 each bid made by the users of system 20 on a particular asset. The bid history includes a detail of the submitted bid (e.g., by whom, price offered, etc.). Bid module 60 is also configured to allow the user that posts the asset in the market database (e.g., the leasing company), to retrieve the 30 bid history, to review the bids contained in the listing, and finally to accept one of the bids to thereby complete the offered transaction.

[00113] Through the foregoing, accumulated information acquired from the tracking and managing of assets can be leveraged to increase financial return when such assets come off of lease and must be disposed of.

5 [00114] In some cases, it is desirable to have a subsystem 300 that runs on a periodic basis, which compares a subset of all assets 22 within system 20 with a series of pre-defined conditions 302 to determine if an action needs to be taken with respect to asset disposition. The pre-defined conditions
10 include either a time variable or a cost variable. For example, one condition using a time variable involves the natural end of an asset lease - including, for example a set time period such as six (6) months prior to an end of a lease. Thus, the time variable is associated with the passage of
15 time. A second condition using a time variable includes a situation such as when a particular asset has excessive usage compared to its time (e.g., hours) in service. An example condition using a cost variable involves an over usage of an asset, wherein based on such over usage, penalties begin to be
20 invoked. Another example condition using a cost variable results when an analysis shows that the cost of leasing an asset appears to be higher than a threshold level when compared to other asset usage options that are immediately available to the asset user (e.g., a lessee) such as by
25 purchasing more assets at a lower cost or reallocating existing assets between locations. It is also possible to develop pre-defined conditions using a combination of time and cost variables. For example, an excessive usage criteria may involve both a time element and a cost element.

30 [00115] As illustrated in Figure 15, if no pre-defined conditions are met at point 302 subsystem 300 terminates at point 304. Alternatively, if a condition is met, subsystem 300 proposes a hierarchy of options at point 306 as to a

proposed action for the benefit of the asset user such as a lessee. The data for making the various options comes from market database 36, global asset database 38, fleet database 40 or asset database 42. As noted above, these may actually 5 be one or more separate databases. Typically, the information used to determine the pre-defined conditions and available options comes from asset identification data, maintenance history data, and lease term. The identification data includes asset make/model and serial number. Lease term may 10 be determined by an analysis of at least two of three pieces of data, namely, lease start date, lease end date, and the length of time between the lease start and end dates.

[00116] Possible options based on pre-defined conditions include: the leasing of additional assets to reduce the amount 15 of use of a pre-existing asset; a comparison of a cost of leasing an asset with a threshold level representing lower cost alternatives; the leasing of additional assets; asset lease renewal; asset purchase or buyout; asset disposal; asset sale; or asset sale and purchase of replacement assets. 20 Associated with each option is the cost of invoking the option and the reasons why the system, in accordance with its review of each option in accordance with the pre-defined rules, believes that the selected hierarchy of options is preferred. Most often the controlling factor will be total price to the 25 asset user for the collection of assets performing the same or similar function.

[00117] Before suggesting lease renewal, for example, the system preferably reviews a database of historical information about lease considerations involving similar assets and 30 alternatively consults with other lessor representatives to determine a quote for renewing the lease term. If this price is lower than other options, it will be listed first.

[00118] Before suggesting the leasing of additional assets, the system preferably reviews current pricing information and asset availability. If the system determines that the overall cost to the asset user will decrease the most if this option 5 is selected, then it will be listed first

[00119] In the case of buyout, subsystem 300 may review any existing contract language between the lessor and lessee concerning a fixed price. If there is no such price, it may then review historical information concerning buyouts 10 involving similar assets potentially taking into account such things as asset condition and usage patterns to make a recommendation.

[00120] Finally, before suggesting lease disposal, subsystem 300 considers the cost, if any, with disposing of an asset 22, 15 so that the information may be provided to the asset user.

[00121] Once subsystem 300 determines the hierarchy of possible options to send to an asset user concerning an asset at point 306, notification is sent to an account manager of the lessor having a relationship with the asset user. The 20 account manager is given a report 308 that includes each asset meeting the pre-defined condition and a link to specific information about the asset including asset description, utilization, maintenance history and costs. If there are a number of assets, the assets may be grouped by asset type, 25 time until lease termination, cost, usage, lessee company, asset location, or any other desired criteria. A group manager, to whom an account manager reports, may see assets associated with each account manager. The group manager can sort assets in any manner available to an account manager, but 30 has the additional capability to sort assets in accordance with each account manager.

[00122] In general, the account manager will review one or more of the proposed options generated by subsystem 302 to confirm his agreement with both the hierarchy and the specifics of each option as shown by point 310.

5 Alternatively, the account manager may just review the present option to confirm his agreement with the specific proposal. In some cases it may be desirable to bypass the account manager to have it sent directly to the asset user. However, in many cases, minor adjustments may be appropriate before the 10 option details are transmitted to the asset user. Depending on the nature of the refinements, however, it may be desirable to refine the pre-defined rules in general or for a particular asset user if the nature of the refinement represents particular preferences of such a user. For example, a 15 particular customer may never wish to buy an asset 22 under any circumstances so an option related to a buyout should never be presented to that customer. Thus, in a preferred embodiment of the invention, the proposed options are manually reviewed, and in the case where modifications are made, the 20 rational for the modifications are incorporated back into subsystem 300. Thus, a rejection of a hierarchy of options generates feedback for selectively modifying the availability of future options by system 300 at either a global or customer level.

25 [00123] Once the option hierarchy is finalized, the options are sent in descending order of expected acceptance, as discussed in more detail below, to an asset user by way of electronic mail, facsimile, regular mail, or even a link available on a web site accessible to the asset user. Two-way 30 electronic communications with simple pre-programmed responses available to the asset user are preferred since no manual updating of subsystem 300 is then required.

[00124] Figure 16 illustrates an example of a report 308 in the form of an interactive screen available to the account manager or group manager with various columns. Typically, report 308 is accessed using a client computer 24 and web server 30, as discussed above. Column 312 shows a listing of various lessee companies. Column 314, which is broken into three sub-columns, relates to end of lease options. The first sub-column gives the months remaining before an option must be selected while the second sub-column gives the actual deadline date. The third sub-column is a hyperlink, which when clicked, gives detail on the various options available and their hierarchy, as well as specific lease related details such as pricing or proposed lease term. The detail can be optionally edited, subject to any internal lessor approval process. Column 316 gives facility information. Broken into two sub-columns, the first sub-column gives city and state information while the detail information associated with asset 22 and its location is accessible by the hyperlink of the second sub-column. Column 318 includes the asset information in sub-column format such as asset make, model and serial number. More complete information including full maintenance history, lease information, and the like is available by way of the detail hyperlink. Finally, column 320 gives the status of various communications sent or received from an asset user. Communication status 320 represents the nature of all communications sent or received back from an asset user and the option currently pending from the hierarchical list of options available for the particular situation. A response by the asset user triggers automatically the next response by subsystem 300 for the particular asset as discussed by way of example below.

[00125] In Figure 16, assets 22 are listed individually by each row, but also sorted by lessee company. In the present

example, assets 22 meeting a pre-defined condition associated with companies LOF and Zen's are activated for review.

[00126] It is also possible for a specific lessee to see a similar screen if accessing the information by way of a client computer 24 and web server 30. However, in such a case, the information would be limited to leases associated with the particular lessee organization. It also facilitates follow up between an asset user and a lessor to avoid undesirable delay in determining what to do with an asset.

10 [00127] If an asset user rejects a particular recommendation as shown by a change in communication status, the next best option is then presented to the account manager for review and transmission to an asset user until a decision is made.

15 [00128] In the example of Figure 15, the option of accepting a new lease involving new asset is first recommended to the account manager at point 322. Typically, this is called "New Item" in column 320. If the account manager agrees with the proposed terms including cost and duration, he sends it to the asset user. Column 320 is updated to reflect "New Item Sent".
20 If the asset user accepts it ("Customer Accepts New Lease" in column) at point 324, then a new asset is delivered to the asset user at point 326, the off-leased asset is picked up and moved to storage for re-sale or re-lease to a different party at point 328. Subsystem 300 then forks to point 390, where system 20 is updated with the data related to the assets at point 392 and terminates at point 394.

25 [00129] If the asset user rejects the new lease option ("Customer Declines New Lease" in column 320) at decision point 324, then the subsystem 300 recommends based on the next most-favorable option, in this example that the asset user renews its lease of the asset ("Renew Lease" in column 320), which the account manager reviews in the form of an updated report at point 332. If he agrees with the proposed terms

including cost and duration, then it is sent to the asset user ("Renew Lease Sent" in column 320). If the asset user accepts this option ("Customer Accepts Renewal" in column 320) at decision point 334, then renewal documentation is sent to the asset user at point 336 with subsystem 300 forking to point 390 as above. If the asset user rejects the second option ("Customer Declines Renewal" in column 320), subsystem 300 then suggests to the account manager that there be a buy out of the asset by the asset user ("Buyout"), which is reviewed at point 338. Once again, if the account manager agrees, the option with relevant detail on the terms of the proposed buyout is sent to the asset user ("Buyout Option Sent" in column 320). If the asset user accepts that option ("Customer Accepts Buyout") at decision point 340 and the generated buyout price, then the asset is sold to the asset user as shown by point 342 with the subsystem forking to point 390.

[00130] Finally, if the asset user does not accept any of the prior options at point 340, then subsystem 300 sends out a request to the asset user concerning when the asset should be picked up ("Pickup Timing Sent" in column 320) at point 344, and the asset is picked up at point 346 at the time and location agreed to at point 344. with subsystem 300 forking to point 390.

[00131] No interaction by the account manager is required once all of the remaining options have been provided. In this example, subsystem 300 determined that the addition of assets 22 while maintaining the existing asset was not a viable option, so it was not presented for consideration.

[00132] While Figure 15 exemplifies one possible course of conduct between a lessor and lessee with respect to a particular asset 22, the actual hierarchy of options will depend on the asset, characteristics of the asset user (e.g., e.g., a local versus a national company) current market

conditions (e.g., asset availability on the open market and pricing), and the nature of the relationship between lessee and lessor (e.g., the existence of any particular preferred arrangement for the benefit of the asset user). Further, even 5 after an asset user agrees to an option, further negotiation as to cost and lease timing may be required. For example, as shown in Figure 16, column 320 shows additional status entries: "New Quote Sent", "New Quote Returned" and "Quote Accepted", reflecting additional level of detail available as 10 part of the operation of subsystem 300.

[00133] In summary, subsystem 300 works as follows. A database is configured and information associated with a plurality of assets 22 is stored in the database. Subsystem 300 analyzes the information in accordance with a set of pre-defined conditions. When a pre-defined condition is met, the subsystem recommends asset disposition using a hierarchy of disposition options, and the conditions and the options are selected to reduce expense and to maximize the return on investment for the asset user. The hierarchy of options are 15 typically manually checked and confirmed, and a rejection of the hierarchy of options generates feedback with the system 20 modifying as appropriate the availability of future options.

Simulated ("Fantasy") Fleet

[00134] Conventional asset management systems lack effective 25 tools for conducting "what if" analyses i.e., modeling a simulated fleet containing both actual assets and proposed assets. The invention overcomes the shortcomings inherent in 30 conventional systems by providing an electronic system 20 for modeling a simulated fleet. For example, if two older machines, each with high maintenance costs, are replaced by two newer machines with lower maintenance costs, but with

higher lease costs, what effect would such a change make on the overall performance of the fleet? The Fantasy Fleet simulator of the present invention enables computer-based modeling that assists answering such questions.

5 [00135] As shown in Figure 3, a Fantasy Fleet may be created in the same manner as an actual fleet (a fleet with real assets). A fantasy fleet may be created by "clicking" on a Create button 108, which invokes the simulated fleet module 50, which in turn prompts the user to input a fantasy fleet 10 name, as well as a location. Once the fantasy fleet has been created, assets may then be added.

15 [00136] To promote the greatest amount of flexibility possible, electronic system 20, to implement the "Fantasy" fleet feature, includes a simulated fleet configuration unit that comprises multiple interfaces/modules for setting up and adding assets to the fantasy fleet. These interfaces/modules include at least one of an add-asset feature of simulated fleet module 50, an add-to fleet feature via the fleet search module 54, an add-to-fleet feature via market search module 58, and a step-by-step entry system of the fleet builder 20 module (not shown), accessible via the "Fleet Builder" button on the user's start page 66. Each will be described in turn.

25 [00137] First, the add-asset feature of simulated fleet module 50 may be used. A user may "click" on link 116 in Figure 3, which causes simulated fleet module 50 to generate a screen output 266 --an asset view-- as shown in Figure 13. The user interface illustrated in Figure 13 operates in substantially the same manner as the user interface illustrated in Figure 4 for assets contained in an existing 30 fleet. For example, the user, by "clicking" on the "Add-Asset" button 268, causes simulated fleet module 50 to present an input data dialog, in accordance with the flowchart of Figure 5, for adding an asset. The user then configures the

asset in the same manner as described above for an existing fleet.

[00138] Second, the add-to-fleet feature of fleet search module 54 may be used. As shown in Figure 9, a user can 5 search his fleets by selecting search button 82 from the user's start page 66 (Figure 3), which invokes fleet search module 54. The search results contain an identification of the assets that are available for selection. Selection may occur, for example, through the use of radio buttons, as shown 10 in Figure 9. The user may then select a destination-simulated fleet through the use of pull down menu 270, and then add the chosen asset to the desired fantasy fleet by "clicking" on Add button 272.

[00139] Third, the add-to-fleet feature of market search 15 module 58 may be used. The further method for adding assets to a fantasy fleet involves conducting a market search, using market search module 56, as illustrated in Figure 10. Then, the user adds assets by selecting the desired destination fantasy fleet through pull down menu 244, and "clicking" on 20 the Add button 242. Through this approach, items available in market database 36 may be added to the fantasy fleet.

[00140] Fourth, a user may use the fleet builder wizard to 25 create a fantasy fleet and configure and add assets. The fleet builder wizard may be invoked by "clicking" on the "Fleet Builder" button 86 on the user's start page 66. This step-by-step entry system leads the user along, prompting for a fleet name, and location, an indication that it is a fantasy fleet, and prompts to add an asset. The add asset feature of the "fleet builder" dialog is substantially the same as the 30 "add asset" feature of the current fleet module 52, described above (e.g., Figure 5).

[00141] Figure 14 shows a report 274 generated by reporting and analysis module 62. In particular, each asset listed in

the report has an associated plurality of parameters, such as average monthly usage hours, total maintenance cost, hourly maintenance cost, total lease cost, total operating cost, total hourly cost, percent utilization, etc. A user can 5 invoke the reporting and analysis module 62 by selecting the Reporting button 92 from the "start" page 66 shown in Figure 3. The user may then select the target fleet (existing or fantasy) for which the report(s) will be generated. A user can evaluate changes made to an existing fleet by generating a 10 report for an existing fleet, configuring a simulated fleet reflecting the proposed changes, and then generating a second report.

[00142] The two reports can be compared and decisions made based on the results of the comparison. In the report shown 15 in Figure 14, the assets enclosed by dashed-line box 276 are part of an existing fleet for which a report (not shown) has already been or will be generated by module 62. The assets shown in dashed-line box 278 are proposed additions to the existing fleet. The combination of the assets in dashed-line 20 box 276, and dashed-line box 278 constitute the simulated or fantasy fleet. One exemplary parameter is total hourly cost 280. Reporting and analysis module 62 is configured to generate report 274 having a composite output 282 that is characteristic of all the assets in the simulated fleet. The 25 composite total hourly cost 282 can then be compared to the corresponding total hourly cost for the existing fleet (in the other report) to make an evaluation of the proposed changes. Another composite output shown in Figure 14 is percent utilization 284. It should be appreciated that some of the 30 composite parameter values are determined by reporting and analyzing module 62 according to an arithmetic sum function, such as the total maintenance cost parameter. Reporting and analyzing module 62 is further configured to determine other

composite parameters, such as hourly maintenance cost, utilization, and total hourly cost, according to an arithmetic average function. The parameters dealing with money amounts (e.g., dollars) required or desirable to make an asset 5 acquisition determination may be characterized as a financial figure of merit. Other parameters, such as utilization percent, may be characterized as a performance figure of merit.

[00143] To the extent that the specific assets included in 10 the simulated fleet have actual usage, performance, utilization, and cost data associated therewith, then such information is used by reporting and analyzing module 62 in computing composite values. However, when the assets are of the type that have no asset-specific data associated 15 therewith, then profiled asset specification data is used in performing the analysis. Additionally, when preconfigured assets from preconfigured database 42 are included in a simulated fleet (or in an actual fleet), then composite data for assets of a similar type are used by module 62 for 20 analysis purposes.

[00144] In accordance with the provisions of the patent statutes, the principle and mode of operation of this invention have been explained and illustrated in several preferred embodiments. However, it must be understood that 25 this invention may be practiced otherwise than as specifically explained and illustrated without departing from its spirit and scope.

CLAIMS

What is claimed is:

- 5 1. An electronic system for facilitating disposition of an asset currently under lease by an asset user, comprising:
 - at least one database configured to store information associated with a plurality of assets;
 - a set of pre-defined conditions related to a recommendation of asset disposition based on an automated analysis of said information within said system, at least one of said conditions being met; and
 - a hierarchy of disposition options generated by said system based on said at least one of said conditions, wherein said conditions and said options are chosen to reduce expense by maximizing return on investment to the asset user.
- 10 2. An electronic system as recited in claim 1, wherein said pre-defined conditions include at least one of a time variable and a cost variable.
- 15 3. An electronic system as recited in claim 2, wherein said time variable comprises a passage of time, said at least one of said conditions being met when an asset approaches the end of a lease term.
- 20 4. An electronic system as recited in claim 3, wherein said options include lease renewal; asset buyout; and asset return.

5. An electronic system as recited in claim 3, wherein
said time variable comprises asset usage within a
predetermined period of time, said at least one of said
conditions being met when asset use exceeds a usage criteria
5 based on time in service.

6. An electronic system as recited in claim 5, wherein
said options include the leasing of additional assets to
reduce the amount of use of a pre-existing asset.

10

7. An electronic system as recited in claim 2, wherein
said cost variable includes a comparison of a cost of leasing
an asset with a threshold level representing lower cost
alternatives.

15

8. An electronic system as recited in claim 7, wherein
said options include the leasing of additional assets.

9. An electronic system as recited in claim 1, wherein
20 said information includes asset identification data,
maintenance history data, and lease term.

10. An electronic system as recited in claim 9, wherein
said identification data comprises an asset make/model and
25 serial number.

11. An electronic system as recited in claim 9, wherein
said lease term includes at least two of a lease start date, a
lease termination date, and a length of time between said
30 lease start date and said lease termination date.

12. An electronic system as recited in claim 1, further comprising a manual check and confirmation of said hierarchy of options, wherein a rejection of said hierarchy generates feedback selectively modifying said availability of future 5 options by said system.

13. An electronic system as recited in claim 1, wherein said options are presented to the asset user for consideration in order of expected acceptance.

10

14. An electronic system as recited in claim 1, wherein one of said options is a new lease, wherein upon acceptance of said new lease, a new asset is delivered to the asset user, an off-leased asset is picked up, and said off-leased asset is 15 disposed.

15. An electronic system as recited in claim 1, wherein one of said options is a renewed lease, wherein upon acceptance of said renewed lease renewal documents are 20 executed by the asset user.

16. An electronic system as recited in claim 1, wherein one of said options is an asset buyout, wherein upon acceptance of said asset buyout, the asset is purchased.

25

17. An electronic system for facilitating disposition of an asset currently under lease by an asset user, comprising:

at least one database configured to store information associated with a plurality of assets;

5 a set of pre-defined conditions related to a recommendation of asset disposition based on an automated analysis of said information within said system, each of said conditions comprising at least one of a time variable and a cost variable, at least one of said conditions being met;

10 a hierarchy of disposition options generated by said system based on said at least one of said conditions, wherein said conditions and said options are chosen to reduce expense by maximizing return on investment to the asset user; and

15 a manual check and confirmation of said hierarchy of options, wherein a rejection of said hierarchy generates feedback selectively modifying said availability of future options by said system.

18. An electronic system as recited in claim 17, wherein said 20 time variable comprising a passage of time, said at least one of said conditions being met when an asset approaches the end of a lease term or when asset usage exceeds a usage criteria based on time in service; and

25 said cost viable including a comparison of a cost of leasing an asset with a threshold level representing lower cost alternatives.

19. An electronic system as recited in claim 17, said information including asset identification data, maintenance history data, and lease term, wherein said identification data comprises an asset make/model and serial number, and said lease term includes at least two of a lease start date, a lease termination date, and a length of time between said lease start date and said lease termination date.

20. An electronic system as recited in claim 17, wherein said options are presented to the asset user for consideration in order of expected acceptance, and wherein,

10 a first of said options comprises a new lease such that upon acceptance of said new lease, a new asset is delivered to the asset user, an off-leased asset is picked up, and said 15 off-leased asset is disposed,

a second of said options is a renewed lease such that upon acceptance of said renewed lease renewal documents are executed by the asset user, and

20 a third of said options is an asset buyout such that upon acceptance of said asset buyout, the asset is purchased.

21. A method for facilitating disposition of an asset currently under lease an asset user, comprising the steps of:
configuring at least one database and storing information associated with a plurality of assets;
5 analyzing said information in accordance with a set of pre-defined conditions, each of said conditions comprising at least one of a time variable and a cost variable;
meeting at least one of said pre-defined conditions;
recommending asset disposition using a hierarchy of
10 disposition options; and
selecting said conditions and said options by reducing expense and maximizing return on investment to the asset user.

15 22. A method as recited in claim 21, further comprising the step of:

instituting a manual check and confirmation of said hierarchy of options; and
said rejection of said hierarchy generating
20 feedback, selectively modifying said availability of future options by said system.

23. An electronic system as recited in claim 21, including the further step presenting said hierarchy of options to the asset user for consideration in order of expected acceptance, and wherein,

5 a first of said options comprises a new lease such that upon accepting said new lease, delivering a new asset to the asset user and picking up and disposing of an off-leased asset,

10 a second of said options is a renewed lease such that upon accepting said renewed lease renewal, the asset user executing renewal documents, and

a third of said options is an asset buyout such that upon accepting said asset buyout, the asset user purchases the asset.

ABSTRACT OF THE DISCLOSURE

A database is configured and information associated with a plurality of assets is stored in the database. The system 5 automatically analyzes the information in accordance with a set of pre-defined conditions. When a pre-defined condition is met, the subsystem recommends asset disposition using a hierarchy of disposition options, and the conditions and the options are selected to reduce expense and to maximize the 10 return on investment for the asset user. The hierarchy of options are typically manually checked and confirmed, and a rejection of the hierarchy of options generates feedback with the system modifying as appropriate the availability of future options.

15

R0109652

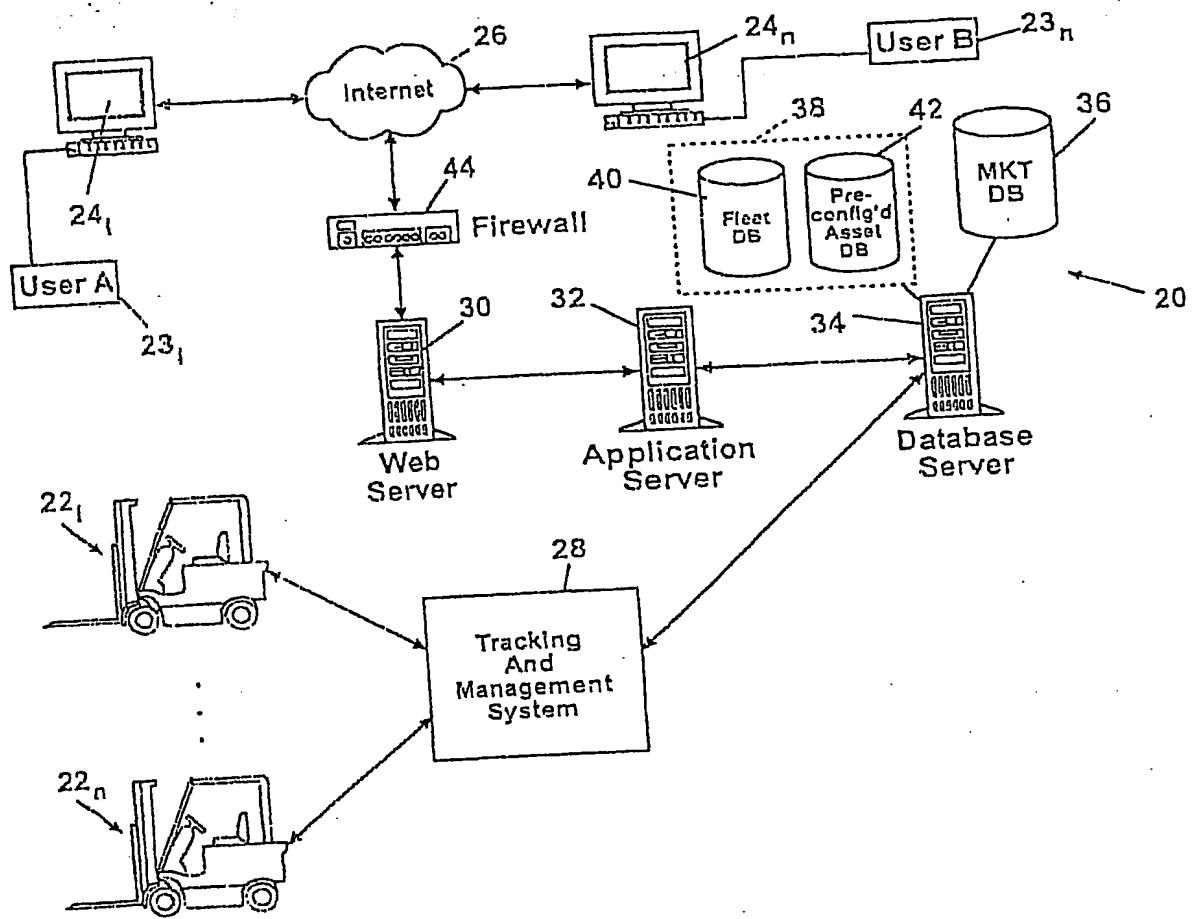
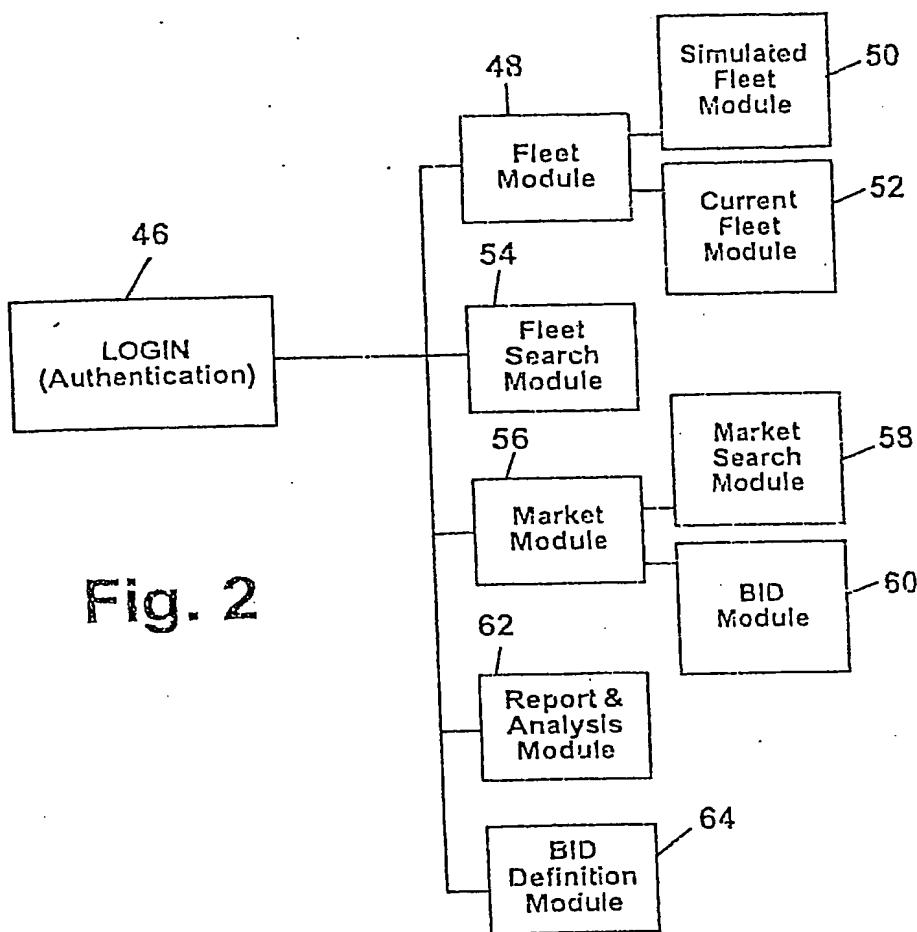


Fig. 1



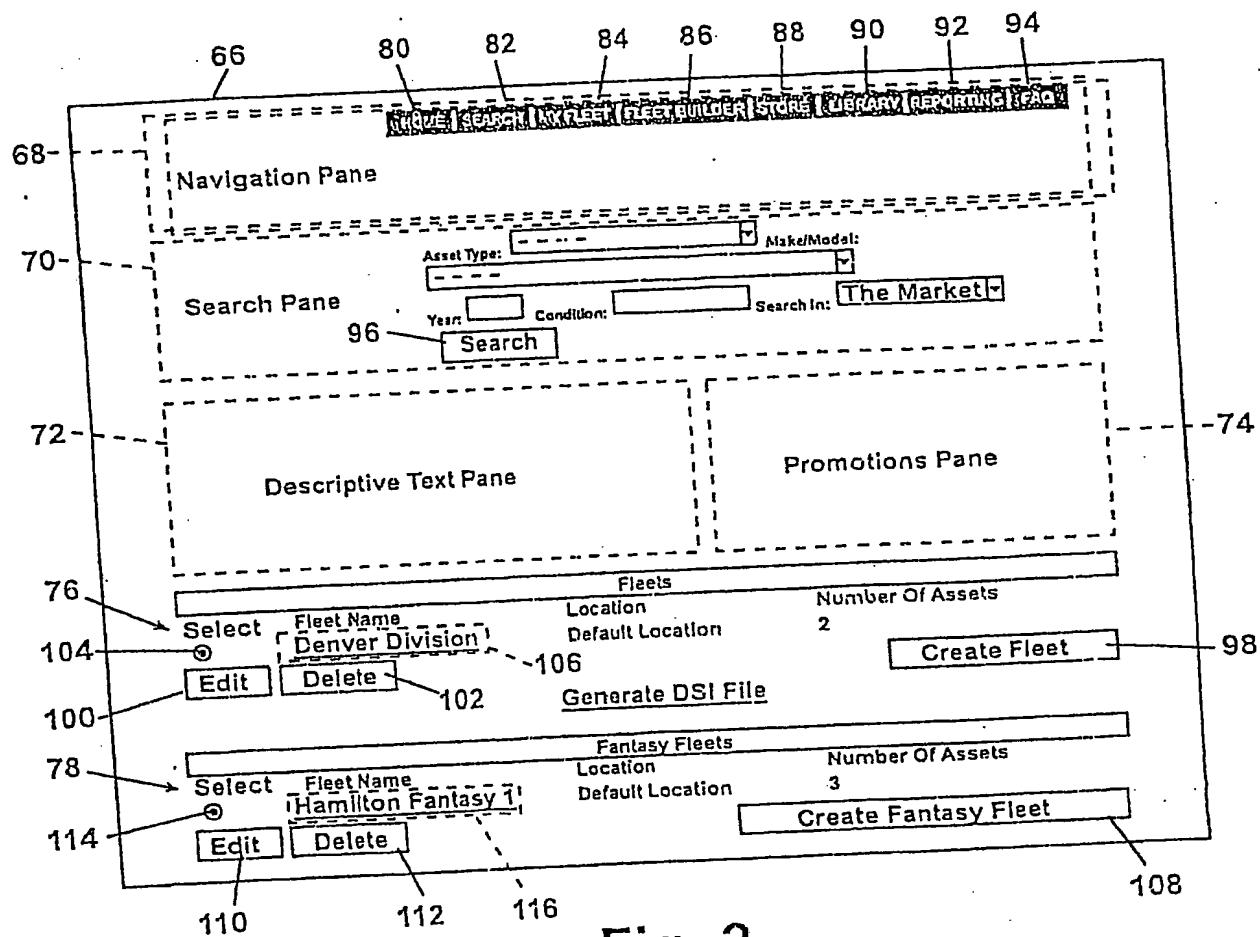


Fig. 3

Assets						
126	Select Serial #	Make	Model	Cap	Type	App
	5551212	Toyota	42-5FG20	5000 lb	Standard Forklift	Light x.xx
	555888	Hyster	S120XL2S	12000 lb	Standard Forklift	Medium x.xx
						x.xx% \$x.xx

132

122

128

124

130₁

130₂

130_n

118

120

Fig. 4

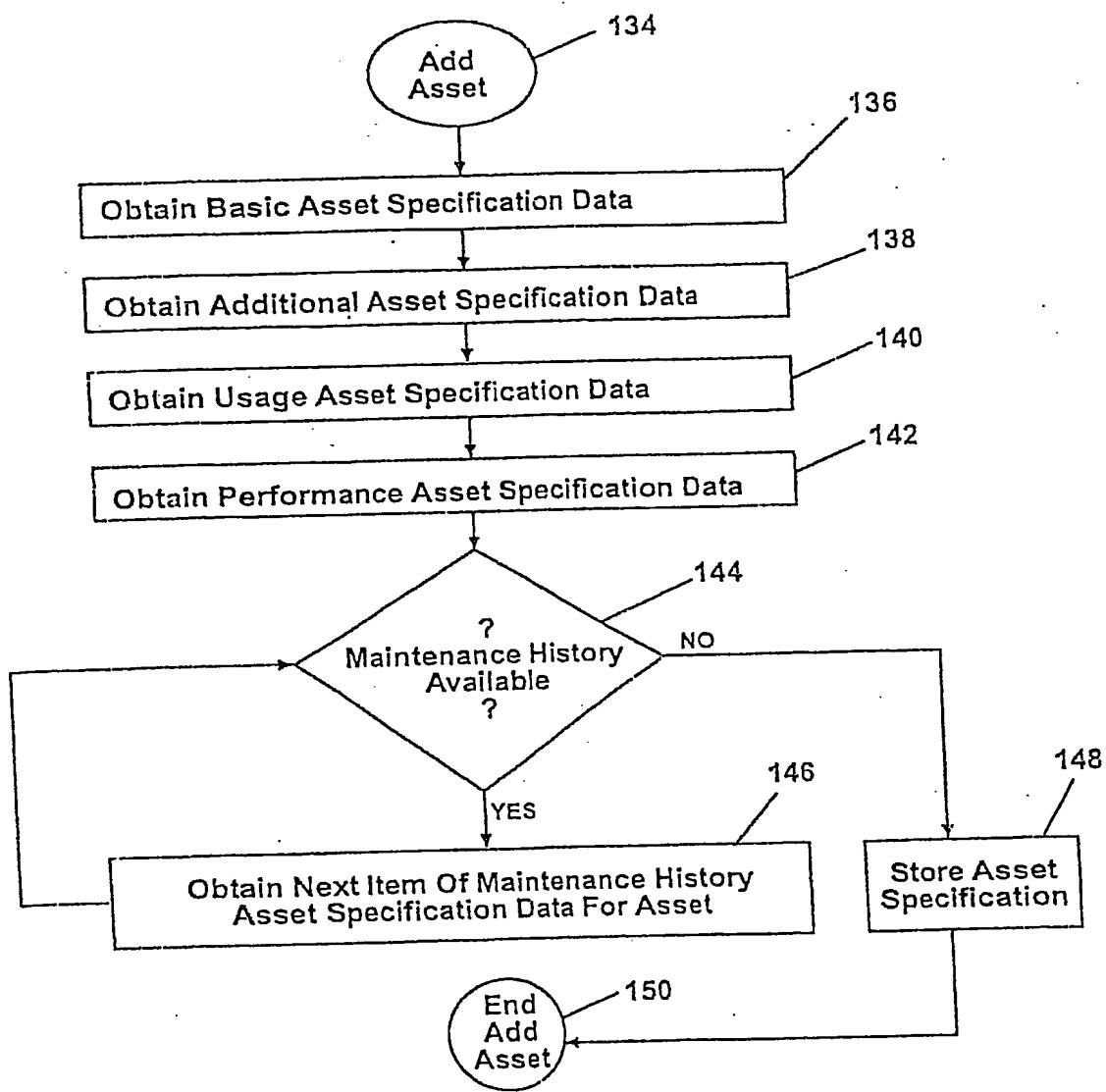


Fig. 5

154

152

<u>Asset</u>					
Serial Number	5551212	List Price	\$XX.XX		
Make	Toyota	Acquired Form	ABC		
Model	42-5FG20	P.M.Hours	150		
Year	1995	Shifts Used	1		
Capacity	5000 lb	Date Warrantied	1/1/00		
Asset Type	Standard Forklift	Warranty Months	6		
Application Rating	Light	Warranty Hours	1000		
Description		Date Warranty Removed			
Fuel Type	Diesel	Burden Labor Rate	\$X.XX		
Tire Type	Cushion	Original Equipment Cost	\$XX,XXX.XX		
Condition	good	Orginal Hour Meter	0		
Power		Original Cost Per Hour	0		
Mast Type	MAST TYPE	Original Usage	0		
Mast Height	188	Original Utilization	0		
Tilt		DSI Asset ID	999		
Attachments		DSI Lease Number	123		
Other Features		Click Here To View Image			
Date In Service	1/1/01				
Comment	this has a cab				
<u>Maintenance</u>					
164	Select	Item Description	Date	Vendor	Cost
	<input checked="" type="radio"/>	Preventive Maintenance	01/10/00	Hyster Sales Company	\$40.00
	<input type="radio"/>	Steering Mechanism	01/05/00	Ryan's Grease Pit	\$200.00
160	Edit	Delete		Add Maintenance Item	
162	166	158			

Fig. 6

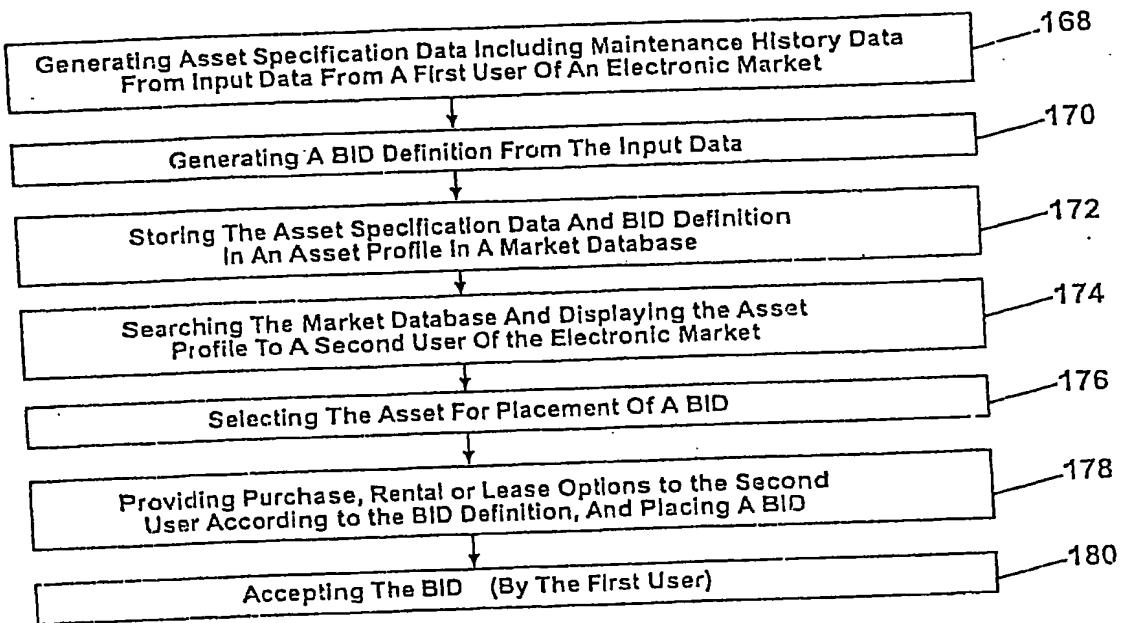


Fig. 7

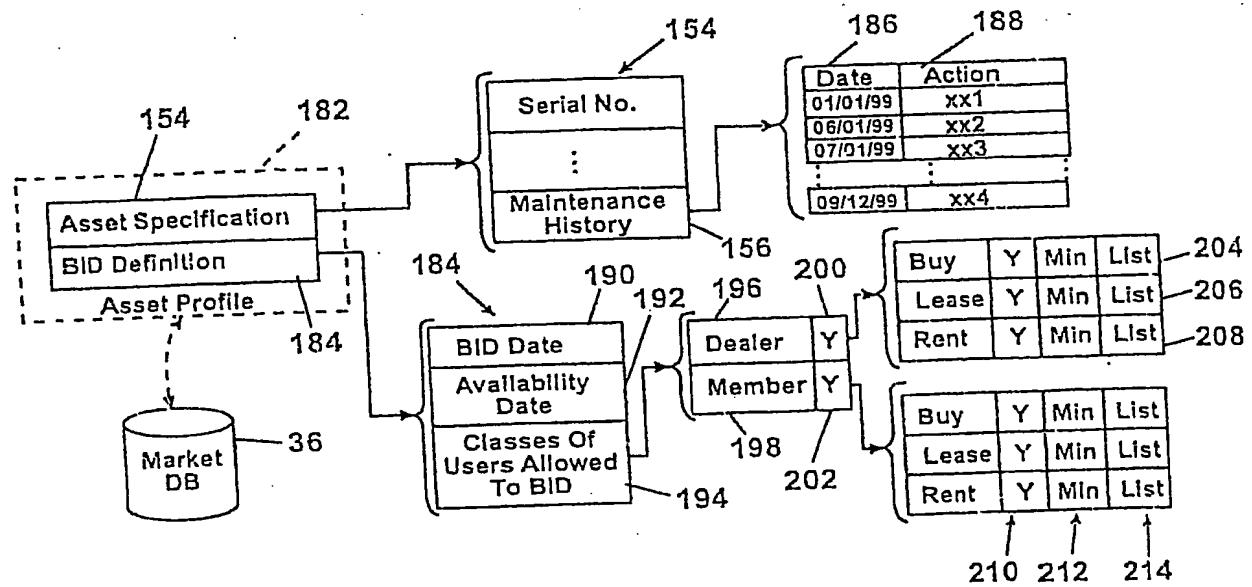


Fig. 8

Fill In The Desired Search Criteria

DSIAssetID:	DSILeaseID:	Year:
DSIAssetID:	DSILeaseID:	Serial Number:
Make/Model:	Capacity:	Application Rating:
Capacity:	Fuel Type:	Condition:
Fuel Type:	Tire Type:	PM Hours:
Tire Type:	Warranty Months:	Mast Height:
Warranty Months:	Warranty Hours:	Orig. Equip. Cost:
Warranty Hours:	Asset Type:	Orig. Hour Meter:
Asset Type:	Location:	Power:
Location:	Tilt:	Mast Type:
Tilt:	Aquired From:	Attachments:
Aquired From:		Other Features:

Cancel **Search**

Select Make and Model

<input checked="" type="radio"/> <u>Hyster S120XL2S</u>	Serial #	555888	Year	1999	Type	Standard Forklift	Fuel	Electric	Capacity	12000	App.	Medium
<input type="radio"/> <u>Toyota 42-4FGC20</u>		5551213		1996		Standard Forklift	Fuel	LPG	Capacity	5000	App.	Light
<input type="radio"/> <u>Toyota 42-5FG20</u>		5551212		1995		Standard Forklift	Fuel	Diesel	Capacity	5000	App.	good

Back **Add To Virtual Fleet** **.....** **Add To Market** **Next**

272

270

215

Fig. 9

216

Market Search Criteria	
Lease:	<input checked="" type="radio"/> 218
Buy:	<input type="radio"/> 220
Rent:	<input type="radio"/> 222
All:	<input type="radio"/> 224
List Price Between \$ <input type="text"/> and \$ <input type="text"/>	
Asset Type: <input type="text"/>	
Make/Model: <input type="text"/>	
Condition: <input type="text"/>	
Year: <input type="text"/>	
Available By: <input type="text"/>	
<input type="button" value="Cancel"/> <input type="button" value="Search"/> 230	

232

Select	Date Available	Description	Make and Model	Capacity	Year	Rating	Status
<input checked="" type="radio"/> 238	1/1/00 1/10/99	asdif sasfd	Allegany Mega-8 Mulfion Swift Slacker	34 12	2000 2000	Heavy Light	SOLD 234
<input type="button" value="Back"/> 240 <input type="button" value="New Search"/> <input type="button" value="Bid on Asset"/> 236 <input type="button" value="Next"/> 235 <input type="button" value="Add To Fantasy Fleet"/> 242 <input type="text" value="244"/>							

Fig. 10

Fig. 11

245

246	Buy: <input checked="" type="radio"/> Purchase Amount: <input type="text"/> 252	254	258	256
248	Lease: <input type="radio"/> Lease Term - 2 Year (24 mos.) <input type="checkbox"/>	Amount: <input type="text"/>	Lease Type: <input type="checkbox"/> Category 1	
250	Rent: <input type="radio"/> Monthly Payment: <input type="text"/> /Month 260	262	264	
<input type="button" value="Cancel"/> <input type="button" value="Lease Calc."/> <input type="button" value="Submit BID"/>				

Fig. 12

266

Fantasy Assets									
Select Serial #	Make	Model	Cap	Type	App	Usage	Util	Cost/Hour	
© 555888	Hyster	S120XL2S	12000 lbs	Standard Forklift	Medium	X.XX	X.XX%	%0.00	
<input type="button" value="Edit"/>	<input type="button" value="Delete"/>	<input type="button" value="Add Asset"/>					<input type="button" value="Add Fleet Charge"/>		
268									

Fig. 13

280

274

Unit ID	Location	Type	Equip. Make	Model	Year	In Service	Last Meter Reading	Avg Monthly Usage Hours	Total Maint. Cost	Hrly. Maint. Cost	Total Lease Cost	Total		
												Hrly. Cost	% Util.	
1984	Charlotte, NC	FL	Clark	RC500-70B	1970	1/1/96	18100	17	5,063.68	5.96	6,100.00	11,363.68	13.32	5%
1546	Charlotte, NC	FL	Clark	0500-45	1962	1/1/96	14780	21	5,884.46	5.69	7,650.00	13,514.48	13.12	6%
4545	Charlotte, NC	FL	Caterpillar	T50D	1992	1/1/96	8484	19	3,208.32	3.42	9,450.00	12,853.32	13.48	5%
2556	Charlotte, NC	FL	Hyster	S80XL2BC	1996	6/1/96	1925	43	691.74	0.36	18,360.00	19,051.74	9.90	12%
6652	Charlotte, NC	FL	Hyster	S120XL2	1996	6/1/96	2248	50	1,134.90	0.50	24,480.00	25,614.90	11.39	14%
7785	Charlotte, NC	FL	Hyster	S155XL2	1996	6/1/96	2532	58	1,378.75	0.54	34,425.00	35,803.75	14.14	16%
3212	Charlotte, NC	FL	Clark	35RRRT	1992	1/1/96	6544	27	2,169.94	1.61	13,750.00	15,949.94	11.85	8%
1199	Charlotte, NC	RT	Crown	30RRRT	1992	1/1/96	9354	35	4,625.78	2.75	13,750.00	18,575.78	19.59	10%
5587	Charlotte, NC	RT	Crown	TR3520	1997	1/1/97	588	35	183.76	.031	75,725.00	75,725.00	27.04	4%
9963	Charlotte, NC	RT	Crown	RR3620	1997	1/1/97	498	13	190.73	0.38	19,725.00	19,915.73	31.98	4%
Total For Location: Charlotte, NC														
									24,712.08	2.15	159,815.00	184,327.08	15.69	8%

282 284

Fig. 14

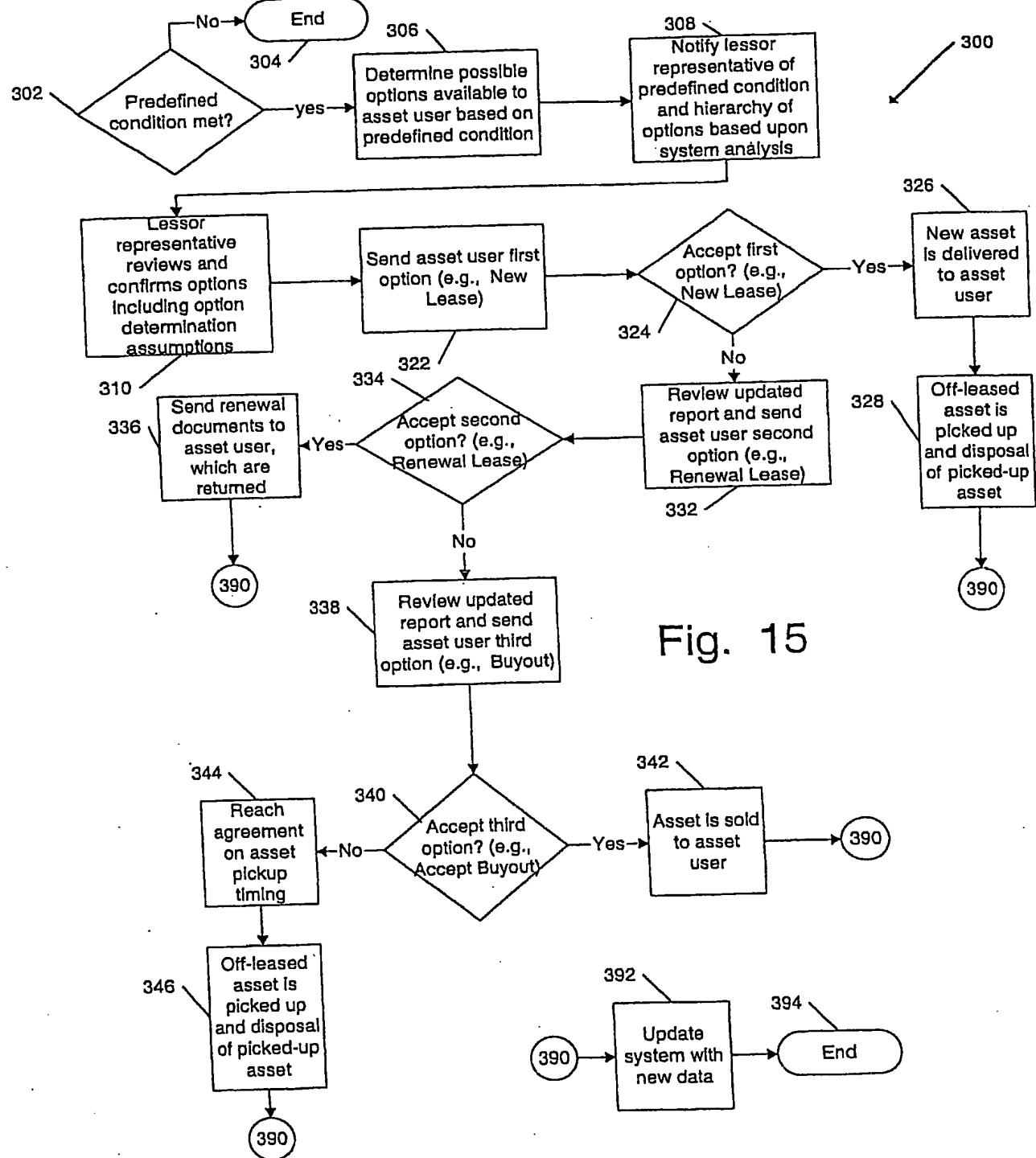


Fig. 15

308

312	314	316	318	320
Company	EOL Info	Facility	Asset Info	Status
▽LOF	▼ 1 mth 12/15/00 detail	Akron, OH detail	Make Model Serial # detail	3 New Quote Sent
	▼ 3 mth 02/01/00 detail	Akron, OH detail	Make Model Serial # detail	4 New Quote Returned
	3 mth 02/01/00 detail	Rock, MO detail	Make Model Serial # detail	6 Quote Accepted
▷Plymouth	14 3 mth			
	5 6 mth			
▷ York	4 1 mth			
	2 2 mth			
	1 3 mth			
	9 4 mth			
	5 5 mth			
	9 6 mth			
▽Zen's	▼ 6 mth 12/15/00 detail	Hope, IN detail	Make Model Serial # detail	1 New
This would be a view of the account manager who manages LOF, Plymouth, York, and Zen's The group manager would see this for all customers. Customers would see just theirs, etc.				
See next page for additional notes				

Fig. 16

Michael B. Stewart

From: AndyFSuhy@aol.com
Sent: Monday, November 26, 2001 12:32 PM
To: mbs@raderfishman.com
Cc: BRENTPARENT@aol.com
Subject: Patent Application

Michael,

This email is in response to your recent request for my signature on a Dana patent application. While you have provided patent application documentation, neither you nor anybody from your client Dana has made any attempt to contact me to discuss this issue in detail, specifically why my signature may be desired, and what risk/rewards are involved now that I am no longer an employee of Dana.

I am more than willing to sign any necessary documents, but will not do so without the proper assessment and due diligence process. Shipping overnight via FedEx 2 inches of documents with a note saying "please sign" does not constitute an effort on your part to acquire my signature. After discussing this issue with Brent Parent, he agrees with my analysis of your request for signature process, which has thoroughly confused us both.

Feel free to call if you would like to discuss this matter further.

Regards,

Andy Suhy
419-344-7966 (mobile)



From: Michael B. Stewart
Sent: Monday, November 26, 2001 12:46 PM
To: 'AndyFSuhy@aol.com'; Michael B. Stewart
Cc: BRENTPARENT@aol.com
Subject: RE: Patent Application

Thanks, Andy. I will give you and Brent a call to try to answer any questions you have.

--mbs

-----Original Message-----

From: AndyFSuhy@aol.com [mailto:AndyFSuhy@aol.com]
Sent: Monday, November 26, 2001 12:32 PM
To: mbs@raderfishman.com
Cc: BRENTPARENT@aol.com
Subject: Patent Application

Michael,

This email is in response to your recent request for my signature on a Dana patent application. While you have provided patent application documentation, neither you nor anybody from your client Dana has made any attempt to contact me to discuss this issue in detail, specifically why my signature may be desired, and what risk/rewards are involved now that I am no longer an employee of Dana.

I am more than willing to sign any necessary documents, but will not do so without the proper assessment and due diligence process. Shipping overnight via FedEx 2 inches of documents with a note saying "please sign" does not constitute an effort on your part to acquire my signature. After discussing this issue with Brent Parent, he agrees with my analysis of your request for signature process, which has thoroughly confused us both.

Feel free to call if you would like to discuss this matter further.

Regards,

Andy Suhy
419-344-7966 (mobile)



FedEx Express
Customer Support
Domestic Trade
3976 Airways Boulevard
Module H, 4th Floor
Memphis, TN 38116

U.S. Mail: PO Box 727
Memphis, TN 38194-4843

Telephone 901-389-3800



August 22, 2002

A;ISA varela
(248) 594-0610

Dear A;ISA varela :

Our records reflect the following delivery information for the shipment with the tracking number 470263976647. The information is incomplete and we regret the inconvenience this may cause. However, as stated in the FedEx Service Guide, we assume no liability for our inability to provide a copy of the delivery record.

Delivery Information:

Signed For By: B.PARENT

Delivered to: 247 STONE OAK COURT

Delivery Date: July 20, 2002

Delivery Time: 11:39 AM

Shipping Information:

Shipment Reference Information: 65678-0042

Tracking No: 470263976647

Ship Date: July 19, 2002

Shipper: RADER FISHMAN GRAUER
PLLC
39533 WOODWARD AVE STE
14
BLOOMFIELD HILLS, MI
483045098
US

Recipient: BRENT C. PARENT
247 STONE OAK COURT
HOLLAND, OH 43528
US

Thank you for choosing FedEx Express. We look forward to working with you in the future.

FedEx Worldwide Customer Service
1-800-Go-FedEx (1-800-463-3339)
Reference No: R2002082200057176041

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Michael B. Stewart

From: Michael B. Stewart
Sent: Thursday, August 29, 2002 9:47 AM
To: Michael B. Stewart; 'andyfsuhy@aol.com'; 'Brentparent@aol.com'
Subject: RE: Application formal papers
PIChecked: true
PICheckedDate: 8/29/2002 9:51:17 AM
PIMessageID: E78242FE-DE3E-4DD4-950F-9F4C8F

I apologize, I made a mistake with your e-mail address, Andy. Thanks.

-----Original Message-----

From: Michael B. Stewart
Sent: Thursday, August 29, 2002 9:46 AM
To: 'adnyfsuhy@aol.com'
Cc: 'Brentparent@aol.com'
Subject: Application formal papers

Gentlemen, we confirm that each of you received packages concerning two patent applications on July 20, 2002. The applications were for an "Apparatus and Method for Tracking and Managing Physical Assets" (5397 DCCSP) and a "System and Method for Disposing of Assets" (5672 DCCSP). We note that that you have not responded to the letters dated July 19, 2002. Therefore, we confirm that that you continue to join in either application. If you have any questions or my understanding is in error, please contact me. Thank you.

--mbs

=====Michael B. Stewart of Rader, Fishman & Grauer PLLC
39533 Woodward Ave., Ste. 140 Bloomfield Hills, MI 48304
PH: +1-248-594-0633 FAX:+1-248-594-0610 mbs@raderfishman.com=====

RADER,

FISHMAN

& GRAUER

PLLC

VIA FEDERAL EXPRESS

(Signature Release – Saturday Delivery)



39533 Woodward Ave., Ste. 140
Bloomfield Hills, Michigan 48304
Tel: (248) 594-0600
Fax: (248) 594-0610

Michael B. Stewart
(248) 594-0633
mbs@raderfishman.com

EV064963435US

July 19, 2002

Andrew F. Suhy, Jr.
8022 North Bridge Way
Maumee, OH 43537

Ref: 65678-0042
Dept:

Suhy

Date: 19JUL02 SHIPPING \$10.67
Wgt: 1 LBS SPECIAL \$10.27
HANDLING \$0.00
TOTAL \$20.94
SERVICE: PRIORITY SATURDAY
TRACK: 4702 6397 6636

Re: U.S. Patent Application for APPARATUS AND METHOD FOR TRACKING
AND MANAGING PHYSICAL ASSETS
Dana Case 5397 DCCSP; Our Ref. 65678-0037

U.S. Continuation-in-Part Patent Application for SYSTEM AND METHOD FOR
DISPOSING OF ASSETS
Dana Case 5672 DCCSP; Our Ref. No. 65678-0042

Dear Andy:

Once again, we enclose a copy of the package that we sent to you on November 16, 2001, including both the letter and the indicated attachments. The attachments comprise complete copies of U.S. patent applications for Dana reference numbers 5397 DCCSP (U.S. Application Serial No. 09/714,702) and 5672 DCCSP (U.S. Application Serial No. 09/990,911), the currently executed versions of combined Declaration and Power of Attorney for each of the applications by other co-inventors for that application, and the Declaration and Power of Attorney you originally executed for 5397 DCCSP. Once again we also have tabbed where you need to sign your name as an inventor for each of the applications on the applicable Combined Declaration and Power of Attorney document.

As we both know, you in fact received the package that we sent to you on November 16, 2001 to your Ohio address. This letter is not being sent to the old New York Address since the package sent was returned for non-delivery and a confirmation written on the package that you had moved.

You sent me an email on November 26, 2001, acknowledging receipt of the package. I responded to the e-mail promptly upon receipt. Further, in response to the email communication, I tried to contact you on your mobile telephone using the phone number you provided in your e-mail, but did not receive any return telephone calls. Your electronic mail communication to me was carbon copied Brent Parent.

On November 20, 2001, Mr. Parent left me a message with both his cellular telephone number and his home number. Within a day or so after receiving your e-mail and responding, I spoke personally with Mr. Parent

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Computer and Internet Law • Trade Secrets • Unfair Competition*

Bloomfield Hills

Washington, D.C.

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Salt Lake City

Tokyo

RADER,

FISHMAN

& GRAUER

PLLC

Andrew F. Suhy, Jr.

July 19, 2002

Page 2

by phone concerning the legal obligations that both you and he have to sign and return the Combined Declaration and Power of Attorney documents based on your employment with Dana Corporation at the time that the invention was developed by each of you as co-inventors for the indicated applications. As I also explained to Mr. Parent, if a joint inventor refuses to join in an application for patent cannot be found or reached after diligent effort, the application may be made by the other co-inventors on behalf of himself or herself and the non-signing inventor. A refusal to sign the Combined Declaration and Power of Attorney is such a refusal.

Based on my discussions with Mr. Parent, he indicated that he would pass on the clarifications that we discussed of the reasons associated with the need for your signature on the enclosed papers.

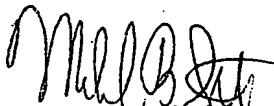
If you have any specific questions, please contact me. Otherwise, please return executed copies of the Combined Declaration and Power of Attorney documents for the two cases. You can keep the patent applications for your records. For your convenience we enclose a self-addressed and stamped Express mail envelope. All you have to do is to put the executed papers in the envelope and drop it in an appropriate US postal service mailbox.

In the absence of receiving the executed Combined Declaration and Power of Attorney documents from you by July 29, 2002, we will be forced to conclude yet again that you will continue to refuse to sign them in accordance with your past efforts with respect to a number of different applications and share this refusal with the United States Patent and Trademark Office.

If you have any questions, please contact me.

Very truly yours,

RADER, FISHMAN & GRAUER PLLC



Michael B. Stewart

MBS/amv

Enc.

R0153718.DOC

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VIA FEDERAL EXPRESS
(Signature Release – Saturday Delivery)

November 16, 2001

Andrew F. Suhy, Jr.
30 Avenue at Port Imperial #301
West New York, NJ 07093

Andrew F. Suhy, Jr.
8022 North Bridge Way
Maumee, OH 43537

Re: U.S. Patent Application for APPARATUS AND METHOD FOR TRACKING
AND MANAGING PHYSICAL ASSETS
Dana Case 5397 DCCSP; Our Ref. 65678-0037

U.S. Continuation-in-Part Patent Application for SYSTEM AND METHOD FOR
DISPOSING OF ASSETS
Dana Case 5672 DCCSP; Our Ref. No. 65678-0042

Dear Andy:

Thank you for your prior assistance in completing a Combined Declaration and Power of Attorney with respect to the above-identified 65678-0037 application. For your convenience, a copy of the executed Combined Declaration and Power of Attorney is enclosed along with a copy of the application as filed. The U.S. Patent Office has requested that you execute a Combined Declaration and Power of Attorney that lists all of the inventors. Therefore, we would appreciate your assistance in executing a copy of the Combined Declaration and Power of Attorney as originally filed with the U.S. Patent Office. To the extent that your address is incorrect, please cross it out and insert the correct home address as well as your country of citizenship. We request that we receive your signed Combined Declaration and Power of Attorney no later than November 28, 2001. This is the date by which the U.S. Patent Office has requested that we respond to the most recent communication. For your convenience, we enclose a self-addressed, stamped envelope.

While we are sending this communication to the most recent address of yours that we have on file, and the address at which we have spoken before, it is our understanding that you may have moved back to the Toledo area. A third party provided the second address above to us. As a result, we hereby send a copy of this letter and the attachments to the second address listed above as well.

RADER,

FISHMAN

& GRAUER

PLLC

Andrew F. Suhy, Jr.
November 16, 2001
Page 2

We would also appreciate your assistance with respect to the above-identified 65678-0042 application, which was filed on November 14, 2001. It is a continuation-in-part application. We enclose a copy of the Combined Declaration and Power of Attorney and Assignment that has been executed by most of the inventors for the application. We would appreciate it if you could sign these documents and return them to us.

If it turns out that you are unwilling to execute any of the enclosed documents, I would appreciate the courtesy of a telephone call so that I can so inform the U.S. Patent Office. My office telephone number is (248) 594-0633 as indicated above. If you wish to speak over the weekend, my home telephone number is (248) 644-1863. Finally, my portable number is (248) 390-0633.

Very truly yours,

RADER, FISHMAN & GRAUER PLLC



Michael B. Stewart

MBS/amv

Enc.

cc: Linda Lentz (w/enc.)
Robert M. Leonardi, Esq. (w/enc.)

R0130354.DOC



PRACTITIONER'S DOCKET NO. 65678-0037

PATENT

COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,
CONTINUATION, OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is for an original application.

INVENTORSHIP IDENTIFICATION

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am an original, first and joint inventor of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

APPARATUS AND METHOD FOR TRACKING AND MANAGING PHYSICAL ASSETS

SPECIFICATION IDENTIFICATION

The specification was filed on November 16, 2000 and assigned Serial No. 09/714,702.

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56.

POWER OF ATTORNEY

I hereby appoint the following practitioner(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Michael B. Stewart Registration Number 36,018

Robert M. Leonardi Registration Number 27,815

Phillip A. Rotman II Registration Number 38,290

I hereby appoint the practitioners associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

SEND CORRESPONDENCE TO

DIRECT TELEPHONE CALLS TO:

Michael B. Stewart
Rader, Fishman & Grauer PLLC
39533 Woodward Avenue, Suite 140
Bloomfield Hills, MI 48304

Michael B. Stewart
(248) 594-0600

Customer Number: 010291

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

~~SIGNATURE~~

Andrew F. Suhy, Jr.
Inventor's signature

Date 3-5-01

Country of Citizenship USA

Residence 30 Avenue at Port Imperial #301, West New York, New Jersey 07093

COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,
CONTINUATION, OR C-I-P)

As a below named inventor, I hereby declare that:

RECEIVED

SEP 04 2002

OFFICE OF PETITIONS

TYPE OF DECLARATION

This declaration is for an original application.

INVENTORSHIP IDENTIFICATION

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am an original, first and joint inventor of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

APPARATUS AND METHOD FOR TRACKING AND MANAGING PHYSICAL ASSETS

SPECIFICATION IDENTIFICATION

The specification was filed on November 16, 2000. I hereby authorize and request my attorney(s) of record in this application to insert the serial number and filing date of this application in the spaces that follow: Serial Number 09/714702 Filing Date: 11/16/00

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56.

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Michael B. Stewart

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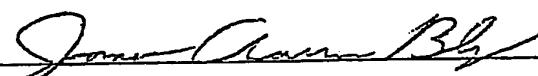
Customer Number: 010291

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURES

J. Aaron Bly
Inventor's signature



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Ryan J. Sherman

Inventor's signature

Date 11-29-00

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Residence 430 E. Fifth Street, Perrysburg, Ohio 43551

Andrew F. Suhy, Jr.

Inventor's signature

Date

Country of Citizenship

Residence

1471 Indian Creek Drive, Perrysburg, Ohio 43551

APPARATUS AND METHOD FOR TRACKING
AND MANAGING PHYSICAL ASSETS

RELATED APPLICATIONS

5 This application claims the benefit of U.S. Application Serial No. 09/441,289 filed November 16, 1999, U.S. Provisional Application Serial No. 60/166,042 filed November 17, 1999, U.S. Application Serial No. 09/503,671 filed February 14, 2000, U.S. Application Serial No. 09/504,000 filed February 14, 2000, U.S. Application Serial No. 09/504,343 filed February 14, 2000, US Application Serial No. 09/653,735 filed September 1, 2000, and US 10 Application Serial No. 09/702,363 filed October 31, 2000, the contents of which are all hereby incorporated in their entirety by reference.

BACKGROUND OF THE INVENTION

15 The present invention relates in general to systems for tracking and managing physical assets to promote the efficient maintenance of the assets while reducing cost. In particular, this invention relates to a computer based system for automatically gathering, analyzing, and delivering information relating to the maintenance of a plurality of such assets, such as a fleet of industrial equipment, so as to maximize productivity and to reduce the operating costs and administrative burdens associated with such assets.

20 Many businesses operate a plurality of physical assets to assist in the performance of the daily activities that are required to produce goods or services. For example, a typical manufacturer of goods often uses a fleet of industrial equipment, such as forklifts, conveyors, machine tools, and the like, in its daily operations to facilitate the manufacture of goods for its customers. In a similar manner, a typical provider of services also often employs a 25 plurality of assets, such as computers, communications equipment, photo imaging equipment, and the like, in its daily operations to facilitate the performance of services for its customers. Traditionally, businesses have purchased such assets for use in their facilities and have employed staff to operate and maintain the assets in furtherance of the manufacture of goods or the performance of services.

30 Regardless of the specific nature of the business, the operation of these assets has usually been considered to be somewhat ancillary to the core nature of the business. In other words, although the use of these assets is helpful (indeed, sometimes necessary) for the business to manufacture the goods or provide the services in a cost efficient manner, the

ownership, operation, and maintenance of such assets is not, of itself, a core function of the business. Consequently, the costs associated with the procurement and utilization of such assets have not been traditionally monitored or analyzed by the business in great detail.

5 Rather, such costs have usually been considered to be relatively fixed costs of doing business, and any management of such assets has been performed, if at all, by relatively low level employees having little training or inclination to increase productivity and reduce costs.

Obviously, many businesses have been able to produce goods and provide services without actively managing the costs of obtaining and operating these assets. However, 10 optimization of productivity and minimization of costs are key considerations in the modern business environment. Thus, it would be desirable to provide a computer based system for automatically gathering, analyzing, and delivering information relating to the procurement and utilization of a plurality of such assets, such as a fleet of industrial equipment, so as to maximize productivity and to reduce operating costs and administrative burdens associated with such assets.

15 It would also be desirable to be able to provide different parties having an interest in the asset ready access to up-to-date real-time and historical access to the information associated with asset usage, maintenance, performance, and the like. For example, besides the business using the asset, there is often a third party maintenance organization that helps to maintain the asset and a leasing company acting as the true asset owner that leases the asset to 20 the business. Because the leasing company lacks appropriate information concerning the asset, the leasing arrangement typically takes this lack of information into account as part of the lease transaction, often through a combination of both a fixed lease amount tied to the asset regardless of use, as well as a financial cushion for the benefit of the true asset owner to cover unforeseen problems associated with the asset including over-use and improper 25 maintenance.

It would also be desirable to be able to provide different parties having an interest in the asset ready access to up-to-date real-time and historical access to the information associated with asset usage, maintenance, performance, and the like. For example, besides the business using the asset, there is often a third party maintenance organization that helps to 30 maintain the asset and a leasing company acting as the true asset owner that leases the asset to the business. Because the leasing company lacks appropriate information concerning the asset, the leasing arrangement typically takes this lack of information into account as part of

the lease transaction, often through a combination of both a fixed lease amount tied to the asset regardless of use, as well as a financial cushion for the benefit of the true asset owner to cover unforeseen problems associated with the asset including over-use and improper maintenance.

5 In some situations it is known to provide a fixed flat rate rental contract that has a variable overtime provision (e.g., an asset owner charges an asset user a flat rate plus an overtime charge in excess of a maximum usage level). However, a manual recordation of the additional time is required as opposed to automatic recording.

In other situations it is known to provide billing tied to calendar usage (e.g., monthly).
10 However, such usage does not take into account objective usage criteria such as actual hours of operation during a fixed time period.

However, if the leasing company and the business both had ready access to the same information concerning the asset, the leasing company may be willing to share an increased portion of the financial risk/reward associated with the asset's usage, maintenance, performance, and the like. With appropriate objective information it may be possible to distribute a portion of the responsibility to other responsible third parties including the asset manufacturer or supplier, and asset maintenance organization.

It is known to record and store operational parameters or fault codes associated with the asset, which may be transmitted using a communications network to a central location for the purpose of undertaking diagnostics. It is also known to use handheld devices for the real-time sharing of information with a central system. The handheld device can access information from the central system such as the status of available inventory. The central system can also provide instructions to a user of the handheld device. Finally, it is known to use various electronic systems for monitoring inventory.

25 However, if each of the entities involved with an asset had ready access to the same information concerning the asset, and the ability to update that information as well as related information associated with maintenance of the asset on a real-time basis, the involved parties may be willing to share an increased portion of the financial risk/reward associated with the usage, maintenance, performance, or the like with respect to the asset. With appropriate 30 objective information it may be possible to distribute a portion of the responsibility to other responsible third parties including the asset manufacturer or supplier, and asset maintenance organization.

SUMMARY OF THE INVENTION

This invention relates to a computer based system for automatically gathering, analyzing, and delivering information relating to the procurement and utilization of a plurality of such assets, such as a fleet of industrial equipment, so as to maximize productivity and to reduce operating costs and administrative burdens. Each of the assets is preferably provided with a data acquisition device for sensing and storing one or more operating characteristics associated therewith such as a fault code generated by the asset when there is a maintenance problem or when routine maintenance is required in accordance with predetermined criteria.

5 That information can be transmitted through space to a receiver connected to a local controller for storing such information and for transmitting such information over the Internet to a remote analysis system. The remote analysis system automatically updates individual records associated with each of the assets with the information received from the Internet. In response to such information, the remote analysis system automatically analyzes the newly 10 provided information and generates reports regarding scheduled maintenance, warranty coverage, and other management information. These reports can be transmitted back over the Internet to an administrative controller for review by one or more persons responsible for 15 managerial review. Additionally or alternatively, the remote analysis system can automatically post such reports on a website and, thus, be made available to one or more of 20 such persons upon request.

Not only can the information be provided to an administrative controller, but also it can be provided to third parties such as maintenance organizations, asset manufacturers or suppliers, and leasing companies. By providing up-to-date real-time and historical 25 information concerning the asset, such third parties are willing to share the risk of the asset's usage, maintenance, and performance through creative arrangements with the asset user. A maintenance organization, for example, may be willing to enter into a fixed maintenance contract when it has the ability to readily detect adverse maintenance trends regarding an asset and is given the ability to take pro-active steps to address problems before they become major. The cost-savings associated with such a pro-active approach by an expert may be 30 shared to the benefit of the business and the maintenance organization. Similarly, a leasing company that can reduce ownership risk through asset monitoring and appropriate asset

utilization is more likely to agree to a hybrid minimum term payment and asset usage billing system or even a usage based billing system with no minimum payments.

Various objects and advantages of this invention will become apparent to those skilled in the art from the following detailed description of the preferred embodiment, when read in light of the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic block diagram of a prior art computer based system for tracking and managing a plurality of assets.

Fig. 2 is a flow chart of a prior art method for tracking and managing assets in accordance with the prior art computer based system illustrated in Fig. 1.

Fig. 3 is a schematic block diagram of a computer-based system for tracking and managing a plurality of assets in accordance with this invention.

Figs. 4A through 4C are three portions, respectively, of a flow chart of a method for tracking and managing assets in accordance with the computer based system illustrated in Fig. 3.

Fig. 5 illustrates the relationship of various parties to a database associated with an analysis controller.

Fig. 6 is a flow chart of a subsystem illustrating the analysis of asset-related information to determine responsibility for asset utilization, and developing a lease relationship between an asset owner and an asset user based on asset utilization criteria.

Fig. 7 is a flow chart illustrating the providing of maintenance to an asset in further detail.

Fig. 8 is a flow chart illustrating what happens after a work order is generated based on maintenance approval.

Fig. 9 is a flow chart illustrating authorization subsystem 200.

Fig. 10 illustrates the operation of data acquisition and analysis subsystem 300.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is illustrated in Fig. 1 a schematic block diagram of a prior art computer based system, indicated generally at 10, for tracking and managing a plurality of assets, several of which are indicated generally at 11. The assets 11 are illustrated

as being a plurality of pieces of movable industrial equipment, such as a plurality of conventional forklifts or similar machinery, used in the manufacture of goods in a typical factory environment. However, the prior art method could be used to track and manage any type of asset 11, such as those described above, used in the manufacture of goods or the 5 performance of services. The basic structure and operation of each of the forklifts 11 are well known in the art and, therefore, require no discussion for a complete understanding of this invention.

The prior art system 10 further included a remote analysis system, indicated generally at 12, for tracking and managing the assets 11. The remote analysis system 12 was 10 completely separate and apart from the assets 11 and included an analysis controller 13 having one or more input devices 14 and one or more output devices 15 connected thereto. The remote analysis system 12 could be embodied as any conventional electronic controller, such as a microprocessor-based computer device. The input device 14 was embodied as a keyboard or other conventional mechanism for manually inputting data in electronic form to 15 the analysis controller 13 for processing in the manner described below. The output device 15 was embodied as a printer or other conventional mechanism for generating a hard copy of the management information generated by the analysis controller 13 in the manner described below.

Referring now to Fig. 2, there is illustrated a flow chart, indicated generally at 20, of a 20 prior art method for tracking and managing the assets 11 in accordance with the prior art computer based system 10 illustrated in Fig. 1. Throughout this discussion, reference will be made to a first person or entity that owns or operates the assets 11 that are being tracked and to a second person or entity that is responsible for tracking the management information relating to such assets 11. Notwithstanding this, it will be appreciated that a single person or 25 entity may not only own and operate the assets 11, but also track the management information relating thereto.

In an initial step 21 of the prior art method 20, a record was created for each individual asset 11 by the person or entity responsible for tracking such assets, such as one of the forklifts 11 illustrated in Fig. 1. This record was created electronically within the analysis 30 controller 13 by means of the input device 14 and included a variety of information that was desired to be tracked for management purposes. First, the record included information that uniquely identified the particular asset 11 being tracked. Such identification information

included, for example, data regarding the make, model, year, and serial number of the asset 11, plus any customer-assigned identification number. Second, the record included information that related to the operational characteristics of the particular asset 11 being tracked, such as the physical requirements or limitations of the asset 11 (mast height, load capacity, type of tires for the forklift 11, for example), the type of fuel used, and the period of time or usage between the performance of periodic maintenance. Third, the record included information relating to the acquisition of the asset 11 by the owner or lessee thereof. Such acquisition information included, for example, the type and date of acquisition (purchase or lease, for example), the name of the owner or lessee, the location at which the asset 11 is used, the expected amount of usage of the asset 11 (one, two, or three shifts, for example), and the cost of the acquisition or lease. Furthermore, the record included an area for adding 10 additional information or remarks as desired.

In a second step 22 of the prior art method 20, it was determined whether a maintenance invoice had been received by the person or entity responsible for tracking the assets 11. Typically, a maintenance invoice was a written communication that was generated 15 created by or at the request of the person or entity that owned or operated the assets 11. The maintenance invoice was usually generated upon the occurrence of an event relating to the particular asset 11 and generally contained information regarding the status of one or more operational characteristics of that asset 11. For example, after a particular forklift 11 had 20 been operated by the person or entity that owned or operated the asset 11 for a particular period of time, it would require the performance of some maintenance. This maintenance may, for example, have constituted routine preventative service as a result of the elapse of a predetermined period of time or usage. Alternatively, such maintenance may have constituted 25 non-routine service, such as a repair of a mechanical breakdown. In either event, a maintenance invoice was generated as a result of the performance of that maintenance. The occurrence of other events related to the assets 11 could also result in the generation of maintenance invoices. In many cases, the maintenance was performed by a maintenance organization having specialized knowledge of asset 11 and its long-term care.

Regardless of the nature of the event that caused them to be generated, the 30 maintenance invoices were generated in hard copy form and contained therein certain information that was desired to be tracked for management purposes, such as the date and nature of the maintenance that was performed, the amount of usage of the asset 11 as of the

date of such maintenance, and the cost of such maintenance. To perform the second step 22 of the prior art method 20, the maintenance invoices were required to be physically delivered from the location where the assets 11 were being used or serviced to the location of the analysis controller 13 or to the location of the input device 14 of the analysis controller 13.

5 By physically delivered, it is meant that the maintenance invoice was transmitted in a non-electronic, hard copy form (including, for example, by facsimile) from the person or entity that owned or operated the asset 11 (and who performed, or had performed, the maintenance on the asset 11) to the person or entity responsible for tracking the assets 11.

As shown in Fig. 2, the prior art method 20 continuously repeated step 22 until it was 10 determined that a maintenance invoice had been received by the person or entity responsible for tracking the assets 11. When that occurred, the prior art method branched from the step 22 to a step 23, wherein the record contained in the analysis controller 13 relating to the particular asset 11 was updated with the information contained in the maintenance invoice. This step 23 was accomplished by utilizing the input device 14 to manually enter the 15 information contained in the maintenance invoice into the record relating to the particular asset 11 contained in the analysis controller 13.

Based upon the updated information contained in the record of the asset 11, the analysis controller 13 was programmed to perform a fourth step 24 of the prior art method 20, wherein it was determined whether a sufficient period of time or usage had elapsed as to 20 trigger the performance of periodic routine maintenance for that asset 11. Typically, such determination was made by determining the amount of the elapsed time or usage of the asset 11 (by comparing the most recent indication of the date or amount of usage of the asset 11 with the previous date or amount of usage contained in the record stored in the analysis controller 13), and by comparing such elapsed time or amount of usage with a predetermined 25 standard (also contained in the record of the asset 11 stored in the analysis controller 13). If it was determined that a sufficient amount of elapsed time or amount of usage had occurred, the method 20 branched from the step 24 to a step 25, wherein a hard copy maintenance report was generated by the output device 15. Then, in step 26 of the prior art method 20, the maintenance report generated in the step 25 was physically delivered from the person or entity 30 responsible for tracking the asset 11 to the person or entity that owned or operated the asset 11. The maintenance report advised the person or entity that owned or operated the asset 11 that the time had arrived for the performance of periodic routine maintenance.

Thereafter, the prior art method 20 entered a step 27, wherein it was determined whether a predetermined period of time had elapsed to generate a periodic management report covering some or all of the assets 11 being tracked. Alternatively, if in step 24 of the prior art method 20, it was determined that a sufficient amount of elapsed time or amount of usage had 5 not yet occurred, the method 20 branched directly from the step 24 to the step 27. In either event, such management reports were typically generated on a monthly basis. Thus, if the end of the month had occurred, the prior art method 20 branched from the step 27 to a step 28 wherein a hard copy management report was generated by the output device 15. Then, in step 29 of the prior art method 20, the management report generated in the step 28 was physically 10 delivered from the person or entity responsible for tracking the asset 11 to the person or entity that owned or operated the asset 11. The management report advised the person or entity that owned or operated the asset 11 of the status of some or all of the assets 11 that were being tracked, allowing various management oversight and decisions to be made at that time.

Thereafter, the prior art method 20 returned from the step 29 to the step 22, wherein it was 15 determined whether a maintenance invoice had been created by or at the request of the person or entity that owns or operates the assets 11 and was physically delivered to the person or entity responsible for tracking the assets 11. Alternatively, if in step 27 of the prior art method 20, it was determined that a predetermined period of time had not yet elapsed to generate a periodic management report covering some or all of the assets 11 being tracked, 20 then the method 20 returned directly from the step 27 to the step 22.

Referring now to Fig. 3, there is illustrated schematic block diagram of a computer based system, indicated generally at 30, for tracking and managing a plurality of assets, indicated generally at 31, in accordance with this invention. As with the prior art system 10 described above, the illustrated assets 31 are represented as a plurality of pieces of movable 25 industrial equipment, such as a plurality of conventional forklifts or similar machinery, used in the manufacture of goods in a factory environment. However, the method of this invention can be used to track and manage any type of asset 31, such as those described above, used in the manufacture of goods or the performance of services.

As above, the basic structure and operation of each of the forklifts 31 are well known 30 in the art, and, therefore, require no discussion for a complete understanding of this invention. However, unlike the forklifts 11 of the prior art system 10, a data acquisition device 32 is provided on each of the forklifts 31 for sensing and storing one or more operating

characteristics of the associated forklift 31. The basic structure and operation of each of the data acquisition devices 32 are conventional in the art. For example, each of the data acquisition devices 31 may be embodied as an electronic processor or controller that can sense or be otherwise responsive to one or more operating conditions of the associated forklift 31. Each of the data acquisition devices 31 can be responsive to any desired operating conditions of the forklift 31 that might be considered important in making effective management decisions regarding the operation of the forklift 31. Such desired operating conditions can, for example, include the time duration of use (and non-use), distances traveled, the extent of fork usage, the nature of hydraulic system utilization, and the like. 10 More typically for industrial assets, the most important criteria is time duration of use. The sensed operating conditions of the forklifts 31 are preferably stored at least temporarily in a memory of the data acquisition device 32 for subsequent communication to a remote analysis system, indicated generally at 50, for analysis in the manner described in detail below. Thus, the data acquisition devices 32 sense and store the desired operating conditions for each of the 15 forklifts 31 during use.

Each of the forklifts 31 is further provided with a transmitter 33 or other communications system for transmitting the acquired data from the data acquisition device 32 to the remote analysis system 50 for analysis. Each of the transmitters 33 may be embodied as any conventional device for transmitting the acquired data to the remote analysis system 20 50, such as a hard-wired communications interface. However, as is well known, each of the forklifts 31 is a movable vehicle that is capable of traveling extensively throughout the particular environment in which it is used. To facilitate the transmission of the acquired data, therefore, the transmitter 33 is preferably embodied as a wireless communications system, such as represented by an antenna 34. The transmitters 33 and the wireless communications 25 systems 34 can be embodied as conventional radio frequency transmitters provided on each of the forklifts 31 that transmit electromagnetic signals. However, other well known forms of wireless communication, such as those utilizing light or sound, may be used in lieu of a radio frequency transmitter.

The wireless communications systems 34 are adapted to transmit signals that are 30 representative of the sensed operating conditions of the forklifts 31 through space to a receiver 35. In contrast to the forklifts 31 that can travel extensively throughout the environment in which they are operated, the receiver 35 is preferably provided at a fixed

location within that environment. If desired, a plurality of such receivers 35 may be provided at different locations within the environment in which the forklifts 31 are operated. As the forklifts 31 move about the environment during use, they will occasionally pass by or near the receiver 35. When this occurs, the receiver 35 receives the data transmitted from the 5 respective data acquisition units 32. The receiver 35 is also conventional in the art.

Preferably, the data acquisition units 32 and the receivers 35 are in bi-directional communication with one another. One advantage of such bi-directional communication is that the data acquisition unit 32 can send out a query signal on a predetermined basis to be received by the receiver 35 when the two units 32 and 35 are sufficiently close to 10 communicate reliably with one another. Thus, when the data acquisition unit 32 contacts the receiver 35, the receiver 35 can send a first signal back to the data acquisition unit 32 to instruct it to begin transmitting the acquired data. At the completion of the data transfer, the receiver 35 can send a second signal back to the data acquisition unit 32 to acknowledge the receipt of the transmitted data. A conventional error checking algorithm can be used to 15 confirm the accuracy and completeness of the transmitted data and, if necessary, request a re-transmission thereof.

Another advantage of such bi-directional communication is that data in the form of new commands, program updates, instructions, and the like can be sent to the data acquisition units 32 from the receiver 35. In some instances, such as when a data acquisition unit 32 is in 20 generally continuous communication with a receiver 35, a user of the forklift 31 can be prompted to provide certain information for transmission to the receiver 35 for further analysis.

The receiver 35 is connected to a local controller 36. The local controller 36 is also, 25 of itself, conventional in the art and may be embodied as an electronic controller that is adapted to receive and store at least temporarily the data from each of the receivers 35. Alternatively, if the assets 31 are fixed in position, such as in the case of a plurality of stationary machines used in a manufacturing environment, the receiver 35 or receivers 35 may be provided on movable structures that move about the environment to receive the 30 information transmitted therefrom. In either event, it is desirable that the local controller 36 acknowledge receipt of the information transmitted from the data acquisition devices 32, allowing the data acquisition devices 32 to delete the transmitted information and begin storing newly acquired information. A combined system including the data acquisition

device 32; the transmitter 33; the wireless communications system 34; the receiver 35, and software for operating the local controller 36 to gather and report data is commercially available, such as from I.D. Systems, Inc. of Hackensack, New Jersey or Requip (formerly SXI).

5 In a preferred embodiment, the various elements located in an asset 31 are hardwired into the electrical system of the asset to minimize the possibility of undesirable failure or tampering.

10 Thus, after the forklifts 31 have been operated for a period of time, the local controller 36 will have gathered and stored therein a certain amount of information regarding the individual operating characteristics for each of the forklifts 31. The local controller 36 is programmed to periodically transmit the information stored therein to the remote analysis system 50 for analysis. This can be accomplished by providing the local controller 36 with a conventional modem 37 or other communications device that can convert the stored information into a format that is compatible for transmission through an electronic 15 communications network, such as the internet 40. As is well known, the Internet 40 is a digital electronic communications network that connects computer networks and organizational computer facilities around the world. Access to the Internet 40 can be easily obtained in most locations through the local telephone lines or by similar means.

20 The system 30 of this invention may be used to track and manage a plurality of assets 31 located at any desired physical location. Additionally, the system 30 of this invention may be used to track and manage assets 31 located at a plurality of different physical locations, as suggested by the dotted lines in Fig. 3. Each different physical location can be provided with one or more receiver 35, a local controller 36, and a modem 37 to connect the system 30 to the Internet 40.

25 As mentioned above, the sensed operating conditions of the forklifts 31 are intended to be transmitted to the remote analysis system 50 for analysis. Referring again to Fig. 3, it can be seen that the remote analysis system 50 includes an analysis controller 51 that is connected to communicate through the internet 40 by means of a modem 52 or similar communications device. If desired, a communications server 51a may be connected between 30 the analysis controller 51 and the modem 52. The communications server 51a is provided to selectively receive and organize the information from each of the local controllers 36 for delivery to the analysis controller 51. The analysis controller 51 can be embodied as any

conventional electronic controller that is capable of receiving the sensed operating conditions of the forklifts 31 and for processing that information in a desired manner described in detail below. Ideally, the sensed operating conditions of the forklifts 31 are used to automatically generate and analyze management reports relating to the procurement and utilization of a 5 plurality of the forklifts 31 to maximize productivity and to reduce operating costs and administrative burdens. An input device 53 and an output device 54, both of which are conventional in the art, may be connected to the analysis controller 51.

As also shown in Fig. 3, one or more administrative controllers 55 (only one is illustrated) can be connected to the internet 40 through respective modems 56 or similar 10 communications devices. Each of the administrative controllers 55 can also be embodied as any conventional electronic controller that can request and receive information from the remote analysis system 50 through the Internet 40. In a manner that is described in detail below, the administrative controllers 55 are provided to request and receive the management information generated by the remote analysis system 50. If desired, the local controller 36 15 can also function as an administrative controller 55, although such is not necessary. An input device 57 and an output device 58, both of which are conventional in the art, may be connected to the administrative controller 55.

Referring now to Figs. 4A through 4C, there is illustrated a flow chart, indicated generally at 60, of a method for tracking and managing the assets 31 in accordance with this 20 invention using the computer based system 30 illustrated in Fig. 3. Throughout this discussion also, reference will be made to a first person or entity that owns or operates the assets 31 that are being tracked and to a second person or entity that is responsible for tracking information relating to such assets 31. As above, it will be appreciated that a single 25 person or entity may not only own and operate the assets 31, but also track the information relating thereto.

In an initial step 61 of the method 60, a record is created for each individual asset 31 by the person or entity responsible for tracking such assets, such as one of the forklifts 31 illustrated in Fig. 3. The record can be created electronically within the analysis controller 51 by means of the input device 53 and can include a variety of information that is desired to be 30 tracked for management purposes, including all of the information described above in connection with the forklifts 11 and the analysis controller 13. Additionally, the record can further include information regarding the nature and time duration of a warranty provided by

the manufacturer or supplier of the assets 31. Such warranty information can be used in the manner described in further detail below to automatically determine whether the responsibility for the maintenance being performed on the asset 31, either in whole or in part, should rest with the manufacturer or the supplier of the asset 31 or with the owner or user of 5 the asset 31.

In a second step 62 of the method 60, it is determined whether a maintenance invoice has been received by the person or entity responsible for tracking the assets 31. Such maintenance invoices can be generated and delivered in the same manner as described above. If it is determined that a maintenance invoice has been received by the person or entity 10 responsible for tracking the assets 31, the method branches from the step 62 to a step 63, wherein the record contained in the analysis controller 51 relating to the particular asset 31 is updated with the information contained in the maintenance invoice in the same manner as described above. Next, the method enters a step 64 wherein the record contained in the analysis controller 51 relating to the particular asset 31 is updated with information from the 15 internet 40. Alternatively, if it is determined that a maintenance invoice has not been received by the person or entity responsible for tracking the assets 31, the method branches directly from the step 62 to the step 64.

As discussed above, the local controller 36 will have gathered and stored therein a certain amount of information regarding the individual operating characteristics for each of 20 the forklifts 31. The local controller 37 is programmed to periodically transmit the information stored therein to the remote analysis system 50 for analysis. The analysis controller 51 can include a memory circuit for storing this information from the local controller 36. The transmission of the information from the local controller 36 to the analysis controller 51 can be performed in real time, upon occurrence of predetermined events (such 25 as the gathering of a predetermined amount of information), or at predetermined time intervals. In any event, the record contained in the analysis controller 51 is automatically updated with the latest information regarding the status of the asset 31, without any human intervention.

Based upon the updated information contained in the record of the asset 31, the 30 analysis controller 51 next determines whether a sufficient period of time or usage has elapsed as to trigger the performance of periodic routine maintenance for that asset 31. This determination can be made in the same manner as described above in connection with 24 of

the prior art method 20. If it is determined that a sufficient amount of elapsed time or amount of usage had occurred, the method 60 branches from the step 65 to a step 66, wherein an electronic maintenance report is generated. If desired, a hard copy of the maintenance report can also be generated by an output device 54 connected to the analysis controller 51. Then, in 5 step 67 of the method 60, the electronic maintenance report generated in the step 66 is delivered from the person or entity responsible for tracking the asset 31 to the person or entity that owns or operates the asset 31 through the Internet 40. As above, the maintenance report can advise the person or entity that owns or operates the asset 31 that the time has arrived for 10 the performance of periodic routine maintenance. Moreover, if a specific fault code has been generated, that can be provided as well. Alternatively, the maintenance report 55 can be delivered to a specialized maintenance organization responsible for maintenance of the assets 31. The electronic maintenance report can, for example, be delivered through the Internet 40 to one or more of the administrative controllers 55 as desired. Alternatively, or additionally, the electronic maintenance report can be delivered through the Internet 40 to one or more of 15 the local controllers 36. Also, in step 68 of the method 60, the electronic maintenance report generated in the step 66 is posted on a website maintained on the Internet 40. The website may be maintained either by the person or entity responsible for tracking the asset 31 or by the person or entity that owns or operates the asset 31 through the Internet 40. As opposed to 20 the direct electronic delivery of the maintenance report to a particular person or group of persons contemplated in the step 67, the step 68 contemplates that the maintenance report is made available to such person or group of persons at their request over the Internet 40.

Thereafter, the method 60 enters a step 69, wherein it is determined whether any maintenance that has been performed on the asset 31 occurred within the warranty period provided by the manufacturer or supplier. Alternatively, if in the step 65 of the method 60, it 25 was determined that a sufficient amount of elapsed time or amount of usage had not yet occurred, the method 60 branches directly from the step 65 to the step 69. In either event, this determination can be made by comparing the date of service or amount of usage of the asset 31 with the warranty information contained in the record for that asset 31 contained in the analysis controller 51. If it is determined that service on the asset 31 occurred within the 30 warranty period, the method 60 branches from the step 69 to a step 70, wherein an electronic warranty report is generated. If desired, a hard copy of the warranty report can also be generated by the output device 54 connected to the analysis controller 51. Then, in step 71 of

the method 60, the electronic warranty report generated in the step 70 is delivered from the person or entity responsible for tracking the asset 31 to the person or entity that owns or operates the asset 31 through the Internet 40. As above, the warranty report can advise the person or entity that owns or operates the asset 31 that the service performed on the asset 31 should be paid for by the manufacturer or supplier of the asset 31. The electronic warranty report can, for example, be delivered through the Internet 40 to one or more of the administrative controllers 55 as desired. Alternatively, or additionally, the electronic warranty report can be delivered through the Internet 40 to one or more of the local controllers 36. Also, in step 72 of the method 60, the electronic warranty report generated in the step 70 is posted on a website maintained on the Internet 40. The website may be maintained either by the person or entity responsible for tracking the asset 31 or by the person or entity that owns or operates the asset 31 through the Internet 40. As opposed to the direct electronic delivery of the warranty report to a particular person or group of persons contemplated in the step 71, the step 72 contemplates that the warranty report is made available to such person or group of persons at their request over the Internet 40.

Thereafter, the method 60 enters a step 73, wherein it is determined whether a predetermined period of time has elapsed to generate a periodic management report covering some or all of the assets 31 being tracked. Alternatively, if in step 69 of the method 60, it was determined that a sufficient amount of elapsed time or amount of usage had not yet occurred, the method 60 branches directly from the step 69 to the step 73. In either event, such management reports are typically generated on a monthly basis. Thus, if the end of the month has occurred, the method 60 branches from the step 73 to a step 74, wherein an electronic management report is generated. If desired, a hard copy of the management report can also be generated by the output device 54 connected to the analysis controller 51. Then, in step 75 of the method 60, the electronic management report generated in the step 74 is delivered from the person or entity responsible for tracking the asset 31 to the person or entity that owns or operates the asset 31 through the Internet 40. As above, the management report can advise the person or entity that owns or operates the asset 31 of the same information as the management reports discussed above. The electronic management report can, for example, be delivered through the Internet 40 to one or more of the administrative controllers 55 as desired. Alternatively, or additionally, the electronic management report can be delivered through the Internet 40 to one or more of the local controllers 36. Also, in step 76 of the

method 60, the electronic warranty report generated in the step 74 is posted on a website maintained on the Internet 40. The website may be maintained either by the person or entity responsible for tracking the asset 31 or by the person or entity that owns or operates the asset 31 through the Internet 40. As opposed to the direct electronic delivery of the management report to a particular person or group of persons contemplated in the step 75, the step 76 contemplates that the management report is made available to such person or group of persons at their request over the Internet.

Fig. 4C demonstrates an additional functional aspect of method 60 using the inventive system. In addition to determining whether a maintenance invoice has been received, if 10 scheduled maintenance has been performed, and determining the party responsibility for certain maintenance activities, it is possible to poll asset data points at point 76 from an analysis controller database 78 associated with one or more discrete analysis controllers 51 that may be associated with one or more businesses. A plurality of databases 78 is shown. One or more separate databases may be combined to form a logical database 78. When a 15 maintenance organization has access to various asset fleets of the same type or make of equipment, it may be beneficial to analyze the relevant information using a larger available knowledgebase of information to analyze appropriate trends. By analyzing the data points, certain maintenance trends can be analyzed and problems can be anticipated before they affect asset utilization. For example, if it turns out that asset 31 has a tendency to need new 20 batteries after a certain period of usage; the need for such batteries can be anticipated and stocked on site when appropriate to facilitate maintenance. As shown in Fig. 4C, once the various trends have been analyzed for assets 31, at decision point 80 it is determined whether preventative maintenance is required. If it is required, the maintenance is performed as shown at point 82 and the information is stored in database 78. The asset data points are then 25 analyzed again until it is determined that no further preventative maintenance is required. Then the system terminates at point 84. Thus, figures 4A through 4C illustrate the use of critical information from assets 31 to perform maintenance and to provide a methodology for providing access to information by various third parties.

There are a number of significant advantages to having appropriate access to and the 30 ability to analyze data associated with an asset 31 and the interaction of various parties with that asset. Fig. 5 illustrates the beneficial interrelationships that promote efficiency by having the various parties associated in some way with an asset 31 in one or two-way communication

with analysis controller 51 either by way of administrative controller 55, reports 71 or 75, web site postings electronic mail, or the like. As illustrated, a maintenance organization 86, an asset manufacturer or supplier 88, asset user/business 90, and asset owner/leasing company 92 all at least provide information to analysis controller database 78 of analysis controller 51. 5 Both an individual user 85 and the asset 31 itself also provide data as illustrated in the figure and discussed herein. Therefore, at the very least each party is required to contribute pertinent information concerning its interaction with an asset 31 to database 78 of asset controller 51, where the information is available for further consideration and analysis.

As already discussed above, asset 31 provides usage and performance data that is 10 stored in asset controller 51 according to certain predetermined criteria important for that asset including such things as asset location, model, age, usage, and maintenance status. Once relevant data is collected, it is possible to analyze utilization of a specific asset 31. It is also possible to analyze a class of assets 31 using one or more types of available data. From 15 such an analysis, best mode practices can be developed with respect to asset utilization including preventative maintenance and a determination of the extent of optimum asset use. More specifically, for example, a business 90 may decide to standardize its fleet of assets, replace specific assets that have demonstrated unreliability, and either upsize or downsize a fleet to maximize safe asset utilization.

As discussed in greater detail with respect to Fig. 9 below, utilization of asset 31 by an 20 individual user 85 is also tracked. A review of the available data can also provide detailed information on the interaction of a business 90 or individual users 85 with assets 31 as opposed to other businesses or users. From such an analysis it is possible to consider training issues, certification, and issues related to particular individuals, whose actions can have significantly influence asset utilization.

25 The role of other vendors such as part distributors, an example of another vendor 93, and maintenance organizations 86 can be compared with respect to other parties in similar roles or historical data to determine their effectiveness. While business 90 may provide its own maintenance of assets 31, a separate maintenance organization 86 is in the illustrated embodiment.

30 A vendor may be penalized or rewarded depending on the results of its activities, providing increased incentives to promote efficiencies. With respect to asset manufacturers or suppliers 88, it is possible to compare assets provided by different parties 88 to determine

how well their assets perform in practice. Thus, warranty issues, maintenance costs, lost operation time, and the like can be determined from an analysis of asset information over time or involving different manufacturers to provide guidance on how assets 31 from a particular manufacturer perform in different environments and as compared to competing assets of other manufacturers or suppliers in that environment.

More specifically, for an asset manufacturer or supplier 88, warranty information as shown by steps 70 through 72 of Fig. 4B is of particular interest. While it may not be appropriate for a supplier 88 to be able to alter information in database 78, the ability to quickly and accurately collect information concerning warranty obligations and the like is of particular benefit to all of the parties. For example, warranty issues may be caught more quickly, ultimately reducing asset cost and operation while simultaneously promoting asset up time.

The advantages of an asset owner 92 having at least one and possibly two-way access to the real-time and historical information stored in analysis controller database 78 as well as the ability to communicate with supplier 88, maintenance 86, and business 90, is illustrated in subsystem 98 illustrated in Fig. 6. It is assumed for the discussion that follows that the owner of the asset 31 is a separate asset owner 92 such as a leasing company, as opposed to business 90 itself, although this is not a requirement of the invention, subsystem 98 is often activated by the asset owner 92 using data from database 78, but typically utilizing its own lease administration and billing systems. In many cases it is also using its own fleet analysis and management systems, which are typically aggregating information from a number of different fleets associated with a plurality of businesses 90. These various systems, one or more of which may be used independently or in concert, are collectively shown at point 99. As noted above, web-site access, generated reports, analysis controllers 51, and administrative controllers 55 provide exemplary access points for pulling asset information from system 30.

An asset owner 92 and an asset user such as business 90 share the common interest in maximizing efficiency by taking into account such variables as asset usage and asset costs. The more information that is available, the more likely that efficiency is maximized. In traditional leasing relationships involving non-fixed or movable assets such as forklifts where minimal asset utilization information is available, the burden of determining the point of maximum efficiency typically rests with business 90, since it has control over the asset.

Therefore, a leasing company 92 typically enters into a lease arrangement where a fixed lease amount is paid in periodic payments by business 90 over the life of the lease. At best, only minor flexibilities are provided. When leasing company 92 regains control of an asset 31 at the end of the lease term, there is uncertainty concerning the condition of the asset. This 5 uncertainty also typically rests with business 90 in the form of a financial cushion incorporated into the leasing relationship.

However, such uncertainty is minimized in the present invention. As shown at point 100, asset owner 92 is able to analyze the various desired objectively generated asset data points associated with an asset 31. As noted above, these data points can include the time of 10 asset usage within a fixed time period, distance traveled, and certain performance parameters associated with the particular asset (e.g., hydraulic system usage or fork usage for fork lifts). As noted above, in practice, for industrial assets the time of use is the most important single data point. Then, as shown at point 102, asset owner 92 may analyze maintenance considerations. For example, a major routine overhaul as compared to a system failure can be 15 analyzed. Then at point 104, the asset owner 92 can compare the raw data from the asset with maintenance conducted during the same time period. By comparing the raw data with maintenance considerations, the owner is able to analyze the asset utilization under the control of business 90 if maintenance organization 86 and supplier 88 are different third parties. For example, the asset owner 92 can determine that an asset 31 has been used very 20 little during the time period, even allowing for maintenance. Alternatively, the owner may determine that the asset is being used continuously when not undergoing maintenance, possibly suggesting that additional assets may be appropriate to reduce overall maintenance stress on the pre-existing asset.

Additional information can be analyzed by the asset owner as shown at decision point 25 106. Typically, the information includes data associated with other parties having access to database 78. As shown at point 108, for example, the asset owner 92 can evaluate the maintenance relationship with maintenance organization 86. If the relationship has been very positive, an appropriate incentive may be provided to the organization in the form of shared cost savings. Alternatively, if the relationship has been negative, an appropriate penalty may 30 also be implemented. The same considerations are available if business 90 acts as its own maintenance organization 86.

Similarly, the asset owner 92 may evaluate its relationship with the asset supplier 88 as shown at point 110. The information may affect asset payments from the owner to the supplier or the future relationship of the parties.

A further evaluation, shown at point 111, may include an analysis of individual users 5 themselves associated with a specific business 90 and their interaction with particular assets 31 or classes of assets, and such things as training level, certification, accident rates, and the like as discussed with respect to Fig. 9 and authentication subsystem 200 below.

One of the key advantages of the present invention is the ability to take data concerning any asset 31 and the interaction with that asset by any party, including user 85, 10 maintenance organization 86, asset manufacturer or supplier 86, business 90, asset owner 92, or other parties/vendors 93. Moreover, groups of assets may be combined. Thus, it is possible to analyze data to identify the cost of owning or using any asset 31 and the productivity of that asset. Moreover, based on an adequately large statistical universe of data it is possible to benchmark asset utilization and cost against others in similar circumstances to 15 identify best practices. Thus, it is possible to efficiency can be maximized while simultaneously minimizing unwanted waste by identifying time and cost saving opportunities. It is also possible to determine those parties providing best practice services with respect to asset utilization (e.g., maintenance) so that their services can be expanded and appropriate recognition given for their efforts. Alternatively, it is possible to identify parties providing 20 unacceptable services so that appropriate remedial action may be taken (e.g., a user 85 has inadequate training to properly use an asset so additional training needs to be provided).

In practice, the present invention provides a business 90 with a report screen showing information regarding the fleet associated with that business. Business 90 compares its current fleet information with its own historical information or pertinent information from 25 unnamed companies in the same general industry. A side-by-side comparison will be provided, thereby providing a business 90 or the asset owner 92 with guidance on how to improve fleet utilization using the best practices comparison.

These various advantages are applicable even if asset owner 92 and business 90 are the same entity. However, more typically with industrial equipment, asset owner 92 is 30 different than asset user 90, where the two parties have entered into a lessor/lessee relationship. In such a case, the information in database 78 may be used to mutually maximize the relationship between the asset owner 92 and the business 90. With appropriate

1 safeguards asset owner 92 may be willing to share in a greater portion of the risk associated
2 with the utilization of asset 31 in determining a lease rate based on an analysis of each user
3 fleet or individual asset as shown at point 112. Most significantly, rather than entering into a
4 traditional fixed lease amount as noted above, asset owner 92 may be willing to enter into a
5 hybrid lease arrangement wherein the lease charge may be a combination of one or more of
6 the following elements: 1) a minimum payment that has to be made if asset utilization is
7 below a pre-determined minimum threshold; 2) a usage based-payment that is made if usage
8 is above the pre-determined minimum threshold and below a pre-determined maximum
9 threshold; 3) a penalty payment or surcharge is made if utilization is higher than the pre-
10 determined maximum threshold; and 4) payments/rewards based on incentive issues such as
11 asset re-allocation or timely maintenance.

12 The decision of whether to use usage-based billing based on one or more objective
13 criteria based on an analysis of asset utilization is shown at decision point 114. The decisions
14 to charge either a minimum payment if a certain usage level is not met, or to charge a usage
15 penalty above a maximum appropriate usage level, are shown by decision points 116 and 118
16 respectively. Thus, a variable-amount lease may be developed based on an analysis of
17 objective criteria that is based in large part on the actual portion of an asset's life that is
18 consumed by the asset user (e.g., usage hours). In a preferred embodiment, the analysis is
19 based on a pre-determined usage/pricing matrix in combination with actual usage for a
20 specified time period. Once a level of maximum efficiency has developed, leasing will
21 typically be primarily, if not solely, based on asset usage billing.

22 Through the use of the innovative leasing arrangement based on improved information
23 availability to asset owner 92, the expenses of an asset user such as business 90 can be more
24 accurately aligned with usage and asset value consumption. More operational flexibility is
25 provided to business 90. When leasing is based predominantly on asset usage billing, a
26 business 90 is able to adopt true off-balance sheet financing (i.e., the business is not required
27 to note a financial obligation even in the footnotes of various financial reports as opposed to
28 standard off-balance sheet leasing where a company must disclose the lease in footnotes even
29 if the lease does not show up on the balance sheet). At the same time, asset owner 92, can
30 collect information from a variety of sources to maximize its relationships with its own
31 vendors and customers to the benefit of all related parties by minimizing inefficiencies and

providing appropriate accountability with maximum accuracy and validity tied to a minimal likelihood for mistakes, misinformation, or even fraud.

These various factors can be adjusted dynamically by the asset owner 92 as a knowledge base is collected within its internal systems 99 and based on the actions of the 5 other related parties. For a sophisticated asset owner with numerous fleets, it can conduct appropriate analyses over all of its fleets to determine certain trends, which it may advantageously use.

For example, if supplier 88 or maintenance organization 86 is responsible for 10 abnormally low asset utilization as opposed to actions within the control of business 90, then the risk associated with these possibilities can be shared between asset owner 92 and various affected businesses 90 and transferred in some fashion to the responsible party. Thus, in a more preferred embodiment of the invention, asset usage is adjusted for maintenance 15 considerations if business 90 is not responsible for its own maintenance.

As shown at point 120, once the readily available information is analyzed in view of 15 the business relationship between an asset owner 92 and a business 90, an invoice and billing module associated with the asset owner's own internal systems 99 is invoked that generates an appropriate invoice that is sent by the asset owner to the business for payment and subsystem 98 terminates at point 122. In a preferred embodiment, once subsystem 98 is 20 developed for a particular situation, and in the absence of an extraordinary event, invoicing is automated based strictly on the objective criteria developed with minimal outside involvement.

A key advantage of the present invention is that real-time data is collected by data 25 acquisition device 34 and timely transmitted to local controller 36 for transmission to database 78 of analysis controller 51. If incomplete or limited data representing only a small portion of the appropriate asset data points are transmitted, then appropriate decisions cannot be made to maximize asset utilization. For example, in the case of forklifts, both time of usage and distance traveled help provide information concerning asset utilization and 30 maintenance considerations.

Thus, the computer based system 30, including subsystem 98, of the present invention provides a superior method for tracking and managing the assets 31 than the prior art system 10. First, by providing the assets with the data acquisition devices 32 and the communications system 33 and 34, the operational characteristics and other information

regarding the assets 31 is automatically sensed and transmitted to the analysis controller 51 on a real time basis, without requiring human intervention or assistance. Second, the analysis controller 51 is programmed to analyze such information as it is received and to automatically generate maintenance and warranty reports in response thereto. Third, all of the reports 5 generated by the analysis controller 51 are automatically delivered to the appropriate persons through the Internet 40, either directly to one or more of the administrative controllers 55 or by posting on a web site, electronic mail or similar mechanisms. Fourth, as shown by subsystem 98, the information can be used to maximize asset usage efficiency. As a result, the computer based system 30 facilitates the gathering, analyzing, and delivering of 10 information relating to the procurement and utilization of the assets 31 so as to maximize productivity and to reduce operating costs and administrative burdens to the benefit of all parties having a relationship with the asset and an interest in its performance.

The providing of maintenance to an asset 31 is illustrated in further detail in Fig. 7. In addition to determining whether it is necessary to provide scheduled maintenance as noted at 15 step 65 of Fig. 4A, changes in operational parameters associated with asset 31 as shown at point 150 may result in the generation of a specific fault code if a maintenance problem is detected that requires a more expeditious response. The fault code may be generated by the asset itself using one or more sensors associated with operational parameters of asset 31 as shown by point 152 and communicated to the data acquisition device 32. In addition, 20 analysis controller 51 may analyze the raw operational data received from the asset 31 and compare it with analysis controller database 78 including the history of the specific asset 31 as well as the history of similar assets from which maintenance trends may be determined as discussed with respect to Fig. 4C above. Based on an analysis of such trends, proactive 25 lower cost maintenance can be timely performed that results in the avoidance of higher cost maintenance at a later date, which happens in the absence of real-time information available for review and analysis.

A fault code may even be generated based on the actions of the asset operator. In a preferred embodiment of the invention, an electronic checklist 154 is completed by the asset operator on a regular basis, which may include information concerning asset performance that 30 is more detailed than that available from a review of raw operational parameters. In accordance with OSHA requirements, for example, at the end of each shift, a forklift operator must complete a checklist concerning the performance of the asset during the shift. Some of

the questions associated with checklist 154 are directed to maintenance issues. Therefore, in a preferred embodiment of the invention, checklist 154 would be completed electronically at the asset 31, and transmitted by way of the data acquisition device 32 to analysis controller 51 as discussed above. The information would be analyzed to determine if an OSHA/repair need 5 is identified. Preferably, the analysis is automated in accordance with a comparison of the operational status with pre-determined rules. For example, if a question asks if there is a hydraulic leak for a forklift and the answer is "yes", then maintenance would be appropriate.

Once it is determined that maintenance of some type is required as shown at point 156 based on an analysis of the operational status of asset 31, a maintenance report 66 is 10 generated as also shown in Fig. 4A and made available electronically at point 67' such as by the Internet or by posting on a website as also shown in Fig. 4A. The use of electronic mail, or the providing of real-time access to the raw data stored within database 78 by the maintenance organization 86, shown in Fig. 5, is also possible to generate the maintenance report 66. An advantage of providing a maintenance organization 86 real-time access to the 15 raw data representing the operational status of asset 31 is that it may develop specialized analysis tools based on its own expertise in maintenance, resulting for example in the creation of specialized rules for use in automatically analyzing raw data in determining whether maintenance is required, minimizing the need for manual review and determination.

In a preferred embodiment, the priority of the proposed maintenance required 158 is 20 noted on the maintenance report. For example, critical maintenance issues should take precedence over routine issues. Moreover, the system generally institutes an approval process as shown at point 160. For example, if the proposed maintenance is related to warranty work such as noted with respect to step 69 of Fig. 4B, the manufacturer or supplier should approve the maintenance. If a lessee is responsible for the proposed maintenance, it should approve 25 the maintenance before it is performed. In some cases, the maintenance organization 86 itself approves the maintenance, such as when it has a contract that involves pre-payment of particular maintenance. Finally, as shown at point 162, in some cases it may be desirable to have the lessor or owner of the asset have the ability to review and override any refusals to perform maintenance since it has the ultimate responsibility for asset 31. If no approvals are 30 given, the process is terminated at point 164. A review of any automated rules that generated a request for maintenance approval may also be appropriate. When maintenance approval is rejected, any automated rules that generated the original maintenance request can be fine-

tuned by including the results of the approval process. Over time, almost all maintenance requests should be generally approved. Information regarding approval is stored in database 78.

For preventative maintenance, it is expected that pre-approval will generally be granted by the necessary parties based on prior agreement as to the nature and timing of such maintenance.

Once maintenance has been approved, a work order 166 is generated. As shown in Fig. 8, work order 166 is sent electronically to appropriate maintenance personnel that contains all of the critical operating data required to effectively schedule and carry out the maintenance. Typically, for example, the data includes hour meter reading, any fault codes, asset identification criteria, operator of record, contact information, and asset location. Moreover, based on information contained within the fault code or retrieved from the knowledgebase, information concerning anticipated parts may also be provided as well as the nearest location from where they may be retrieved (e.g., at a customer location, or from a local servicing dealer). Finally, the work order 166 preferably contains the past recent history of the particular asset 31 so that the mechanic can use this information to expedite maintenance.

In a preferred embodiment of the invention, the work order 166 is transmitted electronically to a handheld device 168 associated with specific maintenance personnel assigned to carry out the maintenance. Device 168 includes an appropriate graphical user interface (GUI) that permits the receiving and transmitting of both alphanumeric and graphical based information. Examples of hand held devices include a variety of systems produced that use either the Palm® operating system from Palm, Inc. or a sub-set of Microsoft® Windows® from Microsoft Inc. Moreover, in a more preferred embodiment of the invention, the hand held device 168 is in real-time two-way communication with analysis controller database 78. Thus, under appropriate circumstances the handheld device 168 can access such things as dealer billing systems, inventory listings, customer work order approval records, and fleet management information. Rather than having the work order include the past recent history of the asset 31 to be serviced, it is possible to use the two-way communication link to request the necessary history when advantageous to do so.

Once the maintenance is completed, handheld device 168 is used to update database 78 as shown at point 170, including labor information and an identification of any parts

required to effect a repair. If not already clear based on the contents of database 78, the inventory location from which any parts were pulled should also be provided. Ideally, the information is transmitted on a real-time basis from the handheld device 168. Alternatively, however, the information can be transmitted upon routine synchronization of the handheld device with database 78. It is also possible to manually enter the information into the database 78.

The maintenance information is passed to database 78 where it may be used to generate maintenance tracking reports 172, and comprehensive invoices 174 listing both labor and part costs. Since the information is integrated with pre-existing asset information, no rekeying is required. Moreover, as noted above with respect to Fig. 4C, the complete maintenance history of a particular asset or class of assets may be reviewed and analyzed in detail for specific trends of interest.

In addition, when parts are used, as shown at point 176, system 30 preferably permits comparison of the parts used with existing inventory for the specified parts storage location. Based on maintenance trends associated with a class of assets 31 or a specific asset 31, it is possible for the system to automatically order replacement parts for an inventory location if the number of parts in a particular inventory fall below a pre-determined threshold as shown at points 178 and 180. The threshold is calculated at least in part based on an analysis of the prior maintenance of both the asset 31 and the class of assets associated with the asset. Other factors may include the age of the class of assets, the time of the year, usage trends and the like. As one example, in the winter different parts may be required as opposed to in the summer. As another example, more tires may be required for a forklift asset if a number of the assets are reaching a preventative maintenance stage where tires have to be replaced. The system terminates at point 182.

It is also possible to provide online copies of parts catalogs including part numbers and exploded views of parts, including to hand held device 168. In some cases a comparison table of equivalent parts may be provided to reduce part acquisition timing or cost. Moreover, system 30 preferably keeps track of part availability and cost throughout a parts availability network. Thus, no one party is required to keep as many items in stock since ready access to items stored at a different location is possible. Transaction costs in locating and requesting items from different locations is minimized since the information is readily

stored and accessible from system 30. Item stock reduction at any one location is also possible for the reasons discussed above where careful quantity controls are implemented.

Under some circumstances it may even make sense to have a central parts depository with inventory actually held and controlled by a third party such as a courier service. For 5 example, the courier service can ship parts as needed to effect a repair or replenish a reduced inventory at a remote location. With a central depository, the cost of maintaining the inventory can be borne by the party having the best ability to do so. For example, if an asset owner 92 has many businesses 90 using a class of assets 31, it may be able to provide economies of scale to the businesses by being responsible for ordering and stocking inventory 10 parts for use by all affected businesses. Non-related businesses may also be provided access to a part inventory at a higher cost, giving them a further incentive to actively participate in system 30 to enjoy improved economies of scale. Thus, system 30 provides enhanced customer service through reduced cost and a more efficient part access and ordering process.

Inventive system 30 provides a number of additional advantages for maintenance. For 15 example, through the use of electronic information transmission and analysis, maintenance information is transferred and available real-time for review and for the initiation of necessary actions such as approval, the tracking of performed maintenance, the ordering of replacement parts to replenish depleted inventories, and automatic invoice generation. Since asset 31 communicates its own maintenance needs in consultation with an appropriate knowledgebase 20 associated with database 78, human intervention is minimized. As more information is gathered over time, the scheduling of preventative maintenance can be optimized to eliminate either too little or too much maintenance. Further, system 30 automates a very paper-intensive and time cumbersome process by permitting direct communication with the various 25 information elements associated with an asset 31. As a result, the flow of data is more effectively controlled, dispersed, routed, monitored, and acted upon. In practice, the number of people involved in the maintenance process can often be reduced while the speed of providing maintenance can be increased. Thus, potential downtime and related performance issues can be more timely addressed.

A further aspect of the invention, authorization subsystem 200 within system 30, is 30 illustrated in Fig. 9. Authentication to access an asset 31 is tied to pre-determined rules. Specifically, authorization subsystem 200 keeps track of all individual users 85 using an asset 31. It prevents asset utilization by uncertified users 85. System 30 may require that a user 85

be trained or certified to utilize certain assets 31. Even if trained or certified, system 30 may only allow a user 85 to access an asset 31 for a limited period of time within a pre-set time range (e.g., OSHA or other work regulations may only permit access for ten (10) hours within every twenty-four (24) hours). Further, authentication may be denied if a user 85 is found to 5 have too many accidents. By tracking regulation requirements, training or certification issues and even accident rates, an asset 31 is more likely to be well maintained and well utilized. As a result, there are reduced operating costs, minimized potential fines through enhanced regulation compliance, and prolonged asset life through appropriate usage.

Apart from user 85, maintenance considerations may make an asset 31 unavailable. If 10 critical maintenance is required, the unavailability of an asset 31 may prevent unwanted problems resulting from inappropriate continued use, again reducing operating costs and extending asset life.

In other situations, authorization subsystem 200 is essentially a beneficial subscription service. For example, a single asset 31 may be available to different users at pre-set times 15 based on a reservation system, which is tracked through authentication subsystem 200. A prior reservation may take precedence over a desire to use an asset without such a reservation. Alternatively, access to an asset 31 may be terminated if payments to a third party such as maintenance organization 86, asset supplier 88 or asset owner 92 are in arrears. Of particular benefit, even when authorizing access, the ability to track usage with respect to a particular 20 user 85 permits different monetary or time-based asset access rates depending on the specific user or entity associated with that user.

As shown at point 201, a record of user 85 is created that may be stored in analysis controller database 78. The information associated with user 85 preferably includes such data 25 as a unique user code, user identification information (e.g., employer, location, address, and contact information) the number/class of assets for which the user is permitted access, safety record (e.g., number of accidents associated with each asset and over what period of total usage or time), and training or certification records.

A user attempts to access a particular asset at point 202. The access may be through the use of an access device 204 associated with the particular user (e.g., access card, magnetic 30 key, or key pad code) and a corresponding approval device 206 associated with an asset 31 that is connected to data acquisition device 32 for authorization confirmation. In turn, as noted above, data acquisition device 32 is associated with transmitter 33, which is in selective

communication with local controller 36. As shown at point 208, when a user attempts to access asset 31 for use, an attempt is first made to access remote system 50 for authorization. If communication is not possible, an attempt is next made to communicate with local controller 36 at decision point 210, which preferably includes a data cache for at least a subset 5 of users 85 associated with a particular facility where an asset 31 is located. The data associated with local controller 36 may not be as up to date as that available from direct access to analysis controller database 78. In turn, if communication is not possible even with the local controller, an asset cache of data 212 associated with a particular asset 31 may optionally be available for access by approval device 206, as shown at decision point 214. 10 Once again, the data may not be as up to date. On the other hand, at times, the data cached within asset cache 212 or local controller 36 may be more up to date than that associated with system 50. The appropriate data is communicated between asset cache 212 and local controller 36, and then between local controller 36 and system 50, as communication between the appropriate devices takes place.

15 Once data related to asset 31 and user 85 is located, system 30 determines if user 85 is an authorized user for asset 31 at decision point 216, or if the asset 31 itself is available for user at decision point 218 in accordance with pre-determined rules or considerations such as those noted above. If authorization is not granted, a communication interface 220 associated with asset 31 preferably gives the reason for the denial and the steps required to obtain 20 authorization 222. It may even be possible to use communication interface 220 to provide interactive training and certification under some circumstances. As suggested above, a communication interface 220 may even be used to complete an interactive asset checklist as discussed above before and after asset operation by each user 85. Finally, even if approval is given, confirmation as well as special instructions or information of importance to user 85, 25 collected at point 224 (e.g., remaining access time, timing for re-training or re-certification, or next scheduled maintenance) may be displayed to the user.

Finally, if a user 85 is not authorized, either because of communication problems or issues associated with either the user or the asset itself, preferably some type of supervisory override, such as a master access device or code and shown at decision point 226, may be 30 selectively implemented between devices 204 and 206 to permit asset utilization. Even if there is such an override, however, information associated with asset utilization is still recorded and communicated as taught above.

Finally, any pertinent authentication subsystem data is stored in database 78. Moreover, pre-determined rules may be established that provide automatic instructions to system 30 when such authentication subsystem data should be communicated to a third party such as a supervisor, trainer, or security personnel as a result of a user attempting to access an asset 31 as shown at point 230. For example, if a user 85 needs to have additional training, that information needs to be communicated to the appropriate party (e.g., supervisor and trainer). Training may take place using internal personnel or it may be outsourced to a vendor 93 (shown in Fig. 5) in a manner similar to maintenance, as discussed above. System 30 makes it possible to schedule training and even track the cost and corresponding benefits of training through access to real-time and historical asset or user data not generally available except in accordance with the teachings of the present invention. As another example, if unauthorized personnel attempt to use an asset 31, it may be appropriate to send an urgent message to appropriate security personnel at the location of asset 31. Finally, authentication subsystem 200 terminates at end point 232.

As shown most succinctly in Fig. 5, numerous parties have access to analysis controller database, which stores data with respect to asset 31 and various parties having a relationship to that asset. The collected data may be used or analyzed in any one of a number of different ways depending on the interests of the party. For example, a maintenance organization is interested in using the data available to improve maintenance and reduce associated costs; asset supplier 88 desires to examine and minimize warranty issues; and asset owner/leasing company 92 desires to appropriately maximize its return on investment, a desire shared with each business 90. From the perspective of an individual user 85, such issues as appropriate training and certification have also been discussed.

“What if” inquiries are particularly important to successful implementation of system 30. For example, when proposing the use of system 30 to a party such as a potential customer, the ability to analyze historical data and performance with respect to similarly situated customers is invaluable to provide a breakdown of costs and possible cost savings. As noted above, with appropriate information, an asset owner 92, such as a leasing company, may be able to share in part of the risk of asset utilization with appropriate data access and control.

To facilitate these types of analyses, it is important to have robust access to analysis controller database 78, which can actually be one or more databases of information tied

together so as to be accessible for the purpose of an analysis of system 30. In a preferred embodiment, hand held device 168 or a similar type of computing device provides a desirable access point to database 78.

However, before the parties can take advantage of system 30, it is essential to create a 5 foundational base of information that provides a framework for further analysis. Ideally, pre-created forms or templates help facilitate data collection and analysis. For example, when talking to a potential customer, it would be helpful to have access to cross-reference materials related to competitor assets, lease pricing rate factors, historical data and the like. Certain query forms can be used to collect relevant raw data and other query forms can be used to 10 retrieve useful data based on a consideration of the raw data to provide the basis for recommended courses of conduct to promote safe utilization and efficiency while reducing costs. Thus, the actual analysis typically takes place at a central location having the appropriate computational resources with the results preferably being transmitted to hand held device 168. Under some circumstances, an analysis is possible directly on-site using the data 15 collected and analyzed without direct access to database 78 based on a sub-set of data and logic protocols in the form of analysis tools stored on hand held device 168.

Even when not in real-time contact with database 78, hand held device 168 is often 20 invaluable. It permits the automation of survey data entry by an account manager so that information concerning assets 31, a business 90, individual users 85, and other related parties may be entered on-site and later transferred to database 78. The use of paper forms and 25 manual translation of information is eliminated, speeding up data entry. For example, in the past an account manager might have handled more than twenty (20) data sheets that tracked specifications of the current fleet of assets 31 for a new customer business 90. The data sheets were taken back to the office and manually entered into a local database. Simultaneously, an intermediate source of error related to manual keying or a similar 30 translation method is eliminated.

A data acquisition and analysis subsystem 300 is illustrated in Fig. 10. Subsystem 300 facilitates the collection of raw fleet survey data 302 upon initiation of system 30 by a party so that a baseline level of data may be provided to system 30 for consideration and 35 analysis. An account manager 304 collects raw data with respect to each affected asset 31 and all parties having interaction with the asset such as the parties identified with respect to Fig. 5 above. Of course, other parties may also contribute fleet survey data if they have

interaction with an asset 31. The data is preferably inputted into a handheld device 168 using pre-defined forms 306, transmitted to a desktop computer 308, and then ultimately stored in analysis controller database 78. To help with analysis of particular data, the process may be reversed, with data pulled from database 78 to desktop computer 308, transmitted to hand held device 168, and used by account manager 304 to perform a desired analysis for any affected party.

Preferably, hand held device 168 uses an operating system 312 provided by Palm, Inc. A forms manager 314 from Puma Technologies, Inc. known as the Satellite Forms software development package is used to generate data forms 306, which are used to enter the required 10 information or display stored data from hand held 168 or from analysis controller database 78. When collecting raw data, account manager 304 follows inquiries associated with form 306 to enter required information. In contrast to manual methods, it is preferably possible to advise when inappropriate data is entered or if a field is missed. Thus, any data entry errors can be addressed on the spot when the source of the original data is readily available. Hand 15 held device 168 stores locally collected data 316 such as fleet survey data 302, may include retrieved data 318 from database 78, and a number of different analysis tools 320 for evaluating the stored data. For example, one analysis tool 320 may use a set of rules to estimate the total life of an asset under the circumstances currently in place at a business 90 and compare them to known "best practices" for the same asset along with proposed process 20 changes to increase asset life to reach the "best practices" level.

Preferably, computer 308 includes an operating system 322 provided by Microsoft such as Windows® 98, Windows® Millenium or Windows® 2000. It has a plug-in 324 provided by the party responsible for hand held operating system 312 to provide a synchronization conduit 326. Synchronization is handled through a conventional or USB 25 serial data port on the desktop computer 308 and a cradle hardware device 328 associated with device 168. During use of synchronization conduit 326, data values and associated data stored on hand held device 168 and desktop computer 308 are interchanged in accordance with parameters provided in forms manager 314 and a corresponding forms manager computer plug-in 330 on desktop computer 308. Desktop computer includes data from hand 30 held device 168, data from database 78 to either be used locally by the computer or transferred to hand held device 168, data received from device 168 or manipulated locally

using one or more analysis tools 332, and data to be transmitted to database 78 for long-term manipulation or storage.

For example, when using subsystem 300 to transfer fleet survey data 302 that has been placed into hand held device 168 as locally collected data 316. The data transmitted includes 5 both data elements and lists of value fields identifying a data source and the specific data values populating each data element. The data is then transferred to database 78 from desktop 308 in accordance with pre-determined rules. Preferably, the data is associated with fixed fields that are consistently defined between hand held device 168 and database 78 so that the data merely populates the appropriate fields within database 78 after it is transferred 10 from the hand held device. Alternatively, the data may be uploaded into a local analysis tool 332 of desktop 308 such as a database or spreadsheet program for final manipulation and then storage in asset controller database 78.

More particularly, in a preferred embodiment of the invention an account manager 304 who is about ready to visit a business 90 determines the type of information that is 15 relevant to be collected during the visit. Using the desktop computer, a list of values as well as data query forms are downloaded from asset controller database 78 and stored on the local desktop computer hard drive, and then transferred to hand held device 168. For example, when first taking an inventory of pre-existing assets for a new business 90, a list of valid value identifiers for forklift analysis may include the following data elements:

- 20 1) Overall customer information
- 2) Customer division information
- 3) Locations of facilities within each division where forklifts are used
- 4) Departments within each facility that use the forklifts
- 5) Broad descriptions of the types of ways or industries for which the forklifts are used
- 25 6) For each forklift:
 - a) Manufacturer/Supplier
 - b) Power supply type
 - c) Mast type
 - d) Tire type
 - 30 e) Forklift attachments
 - f) Forklift type/model
 - g) Forklift serial number

- h) Any label used by a customer to uniquely identify the forklift
- i) Date the forklift went into service
- j) Number of hours that the forklift has been in use according to its meter.
- k) Lease/rental contract information
- 5 l) Maintenance history
- m) Maintenance contracts.
- n) Forklift dealer
- o) The number of months/and/or usage hours covered pursuant to the manufacturer/supplier warranty.
- 10 p) Original purchase cost
- q) Manufacturing date
- r) Forklift condition (e.g., based on a scale such as new or used)
- s) Application rating (e.g., heavy, medium or light)
- t) Administration fees charged for providing financing/maintenance or the like
- 15 u) Criteria providing feedback concerning the number of hours at which preventative maintenance should be performed
- v) Capacity, typically in pounds or kilograms
- w) Number of hours or shifts the forklift is used each day
- x) Number of days a week that a forklift is used

20 The tables are downloaded to hand held device 168 using synchronization conduit 326 and the relationship between forms manager 314 and forms manager computer plug-in 330. In practice, the transfer of data value tables and their related values has also included the use of a program written in a product called Sybase Powerbuilder from Sybase, Inc. Under such circumstances analysis controller database 78 is a Sybase database. Further, desktop 25 computer 308 may include a different database manipulation program called DBASE acting as one of the local analysis tools to review and possibly manipulate data received from hand held device 168 or analysis controller database 78 before forwarding it to the receiving device.

30 The collection of fleet survey data 302 is merely an example of subsystem 300 in use. Moreover, even when an account manager 304 is collecting fleet survey data 302, it is preferred that if some of the data associated with a survey is already stored in database 78 (e.g., customer contact information, divisions, or asset locations), it is used to pre-populate

appropriate forms 306 to simplify redundant data entry by the account manager. Further, if an error exists based on an inaccuracy in the pre-existing data, account manager 304 can correct it.

The collected and manipulated data provides a starting point for each asset 31 going forward as well as a base foundation for immediate asset fleet analysis since at least some historical data has preferably been collected for existing assets. Thus, even at the beginning of the utilization of system 300, the initially collected data can be analyzed in accordance with pre-existing data involving other fleets, best practices, and the like, to provide immediate guidance on how to improve current fleet utilization and efficiency. The same subsystem 5 may be used to transfer data and recommendations back to hand held device 168, except that this time forms 306 perform a data presentation function as opposed to a query function. As suggested above, some analysis of data may be performed directly on hand-held device 168 although more sophisticated analysis tools 332 are typically associated with desktop computer 308 or asset controller 51 in view of their enhanced computational power and storage 10 capabilities.

15

Subsystem 300 has been shown using synchronization. It is recognized of course, that real-time access is also possible between hand held device and either asset controller 51 or desktop computer 308 without the need to use cradle 328. An advantage of real-time access between a hand-held device 168 and database 78 is that information may be immediately 20 transmitted and received, providing access to the full range of data values and associated data available in database 78. The uploading and downloading of pre-created data forms 306 to help facilitate the collection and analysis of data is also expedited. Further, under some circumstances real-time error checking may be available. For example, if an account manager 304 indicates the number of assets available at a physical location and the actual number in 25 database 78 is different, the manager can be asked to undertake verification while still present at the physical location. Otherwise, to the extent that there are discrepancies, they may be considered after data synchronization takes place.

The same methodology discussed with respect to subsystem 300 may also be used by 30 maintenance personnel as discussed with respect to Fig. 8 above. Work order 166 acts as a pre-populated form 306 transmitted to a hand held device 168. Once the maintenance is completed a different form 306 may be used to communicate the necessary maintenance labor

and parts information so that a maintenance tracking report 172, invoice 174, and determination of inventory replenishment 178 may be implemented.

In accordance with the provisions of the patent statutes, the principles and modes of operation of this invention have been explained and illustrated in preferred embodiments.

5 However, it must be understood that this invention may be practiced otherwise than as specifically explained and illustrated without departing from its spirit or scope.

CLAIMS

What is claimed is:

1. A system for gathering and analyzing data relating to a non-fixed movable asset comprising:
 - a local controller located at a first location for acquiring data that is representative of at least one operating characteristic of the asset;
 - an analysis controller located at a second location that is responsive to said acquired data from said local controller for generating an analysis of said acquired data;
 - an electronic communications network connected between said local controller and said analysis controller and permitting transmission of said acquired data from said local controller to said analysis controller; and
 - a hand held device receiving at least a sub-set of said acquired data stored in said analysis controller.
2. A system as recited in claim 1, wherein said hand held device is in direct contact with said analysis controller.
3. A system as recited in claim 1, wherein a second computer system is disposed between said analysis controller and said hand held device.
4. A system as recited in claim 3, wherein said second computer system receives said acquired data, selectively modifies aspects of said acquired data, and forwards said acquired data including said modified aspects, to said hand held device.
5. A system as recited in claim 1, wherein said hand held includes forms, said forms providing data values for the entry of foundational data associated with said data values, said data values and said foundational data being transmitted to said analysis controller.
6. A system as recited in claim 5, wherein said foundational data is collected prior to said acquired data.

7. A system as recited in claim 1, wherein said hand held receives parts data associated with the asset, said parts data in the form of at least one of inventory, inventory location, and a parts catalog.

8. A system as recited in claim 1, wherein said analysis controller includes a database, said database including data values, collected data and comparison data being available for a selected data value.

9. A system as recited in claim 8, wherein said comparison data represents one of a best practice level and past historical data to provide a base point for comparison with said collected data.

10. A system as recited in claim 8, wherein said collected data includes at least user data representing a user accessing the asset.

11. A system as recited in claim 10, wherein said user data includes at least a subset of user identification, and access authorization.

12. A system as recited in claim 11, wherein said access authorization includes an analysis of user training or user certification with respect to a class of assets including the asset.

13. A system as recited in claim 10, wherein said system includes an authorization subsystem, said authorization subsystem including an asset access mechanism to receive said user identification from a data transmission point associated with the asset and comparison of said user identification from said data transmission point with said user identification from a remote database to confirm the identify of said user.

14. A system as recited in claim 12, wherein said remote database is one of said local controller and said analysis controller.

15. A system as recited in claim 12, wherein said user identification is compared to access authorization to confirm proper authentication, said asset access mechanism permitting operation of the asset upon proper authentication.

16. A system for gathering and analyzing data relating to a non-fixed movable asset comprising:

a local controller located at a first location for acquiring data that is representative of at least one operating characteristic of the asset;

an analysis controller located at a second location that is responsive to said acquired data from said local controller for generating an analysis of said acquired data;

an electronic communications network connected between said local controller and said analysis controller and permitting transmission of said acquired data from said local controller to said analysis controller, said analysis controller including a database, said database including data values, collected data and comparison data being available for a selected data value; and

a hand held device including a form, said form providing at least a subset of said data values for the entry of foundational data, said foundational data being transmitted to said analysis controller and stored in said database.

17. A system as recited in claim 16, wherein said comparison data represents one of a best practice level and past historical data to provide a base point for comparison with said collected data.

18. A system for gathering and analyzing data relating to a non-fixed movable asset comprising:

an asset access device;

a local controller located at a first location for acquiring data received from said asset access device that is representative of a request for user authentication;

an analysis controller located at a second location that is responsive to said user authentication to generate an analysis of said request; and

an electronic communications network connected between said local controller and said analysis controller and permitting transmission of said request from said local controller to said analysis controller.

19. A system as recited in claim 18, further including an authorization subsystem, said asset access device receiving a user identification, said user identification being compared with a corresponding user identification stored in said asset controller, and providing selective access authorization based on additional user data stored in said asset controller for said user identification.

20. A system as recited in claim 18, wherein said additional user data includes at least one of user training or user certification with respect to a class of assets including the asset.

ABSTRACT OF THE DISCLOSURE

A computer based system automatically gathers, analyzes, and delivers information relating to the procurement and utilization of a plurality of such assets, such as a fleet of industrial equipment, so as to maximize productivity and to reduce operating costs and administrative burdens. Each of the assets is preferably provided with a data acquisition device for sensing and storing one or more operating characteristics associated therewith. That information can be transmitted through space to a receiver connected to a local controller for storing such information and for transmitting such information to a remote analysis system. The remote analysis system automatically updates individual records associated with each of the assets with the information received. In response to such information, the remote analysis system automatically analyzes the newly provided information and schedules maintenance as required. Information associated with the maintenance is also recorded electronically to maximize efficiency, provide historical trends, automate billing, and control inventory levels. The invention also includes an authentication subsystem and a mechanism for using a hand held device to collect and analyze data.

R00985957

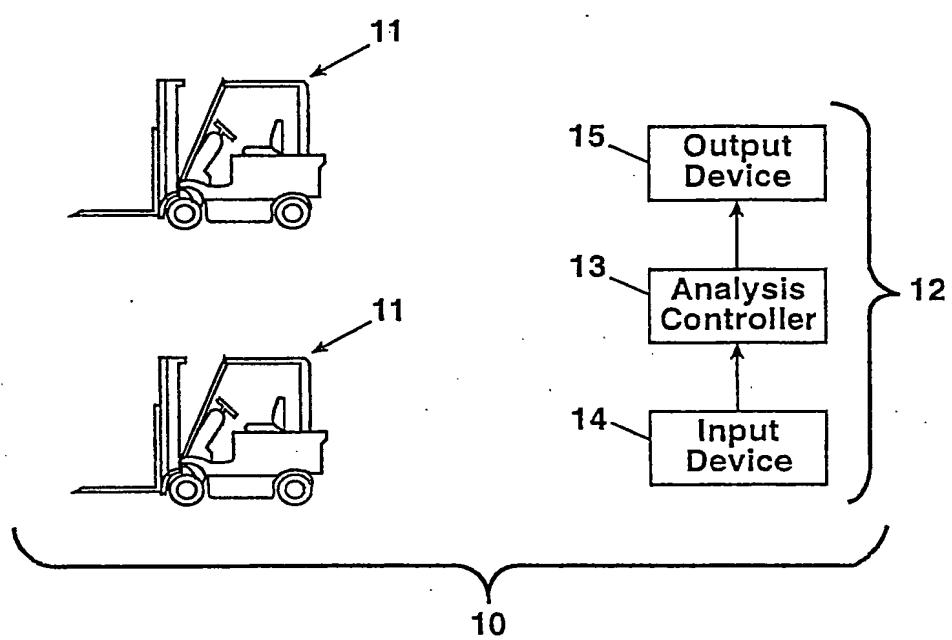


Fig. 1 (PRIOR ART)

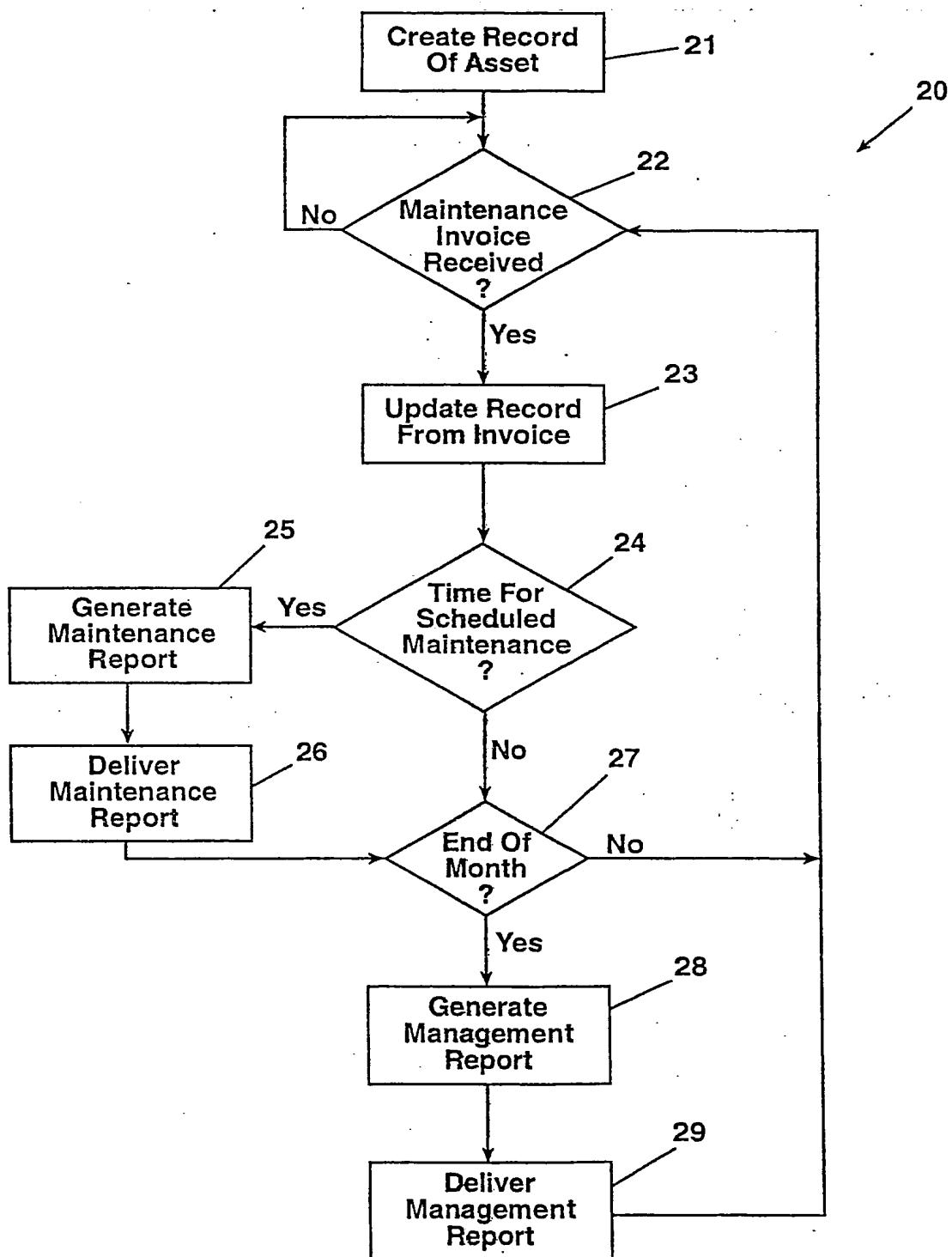
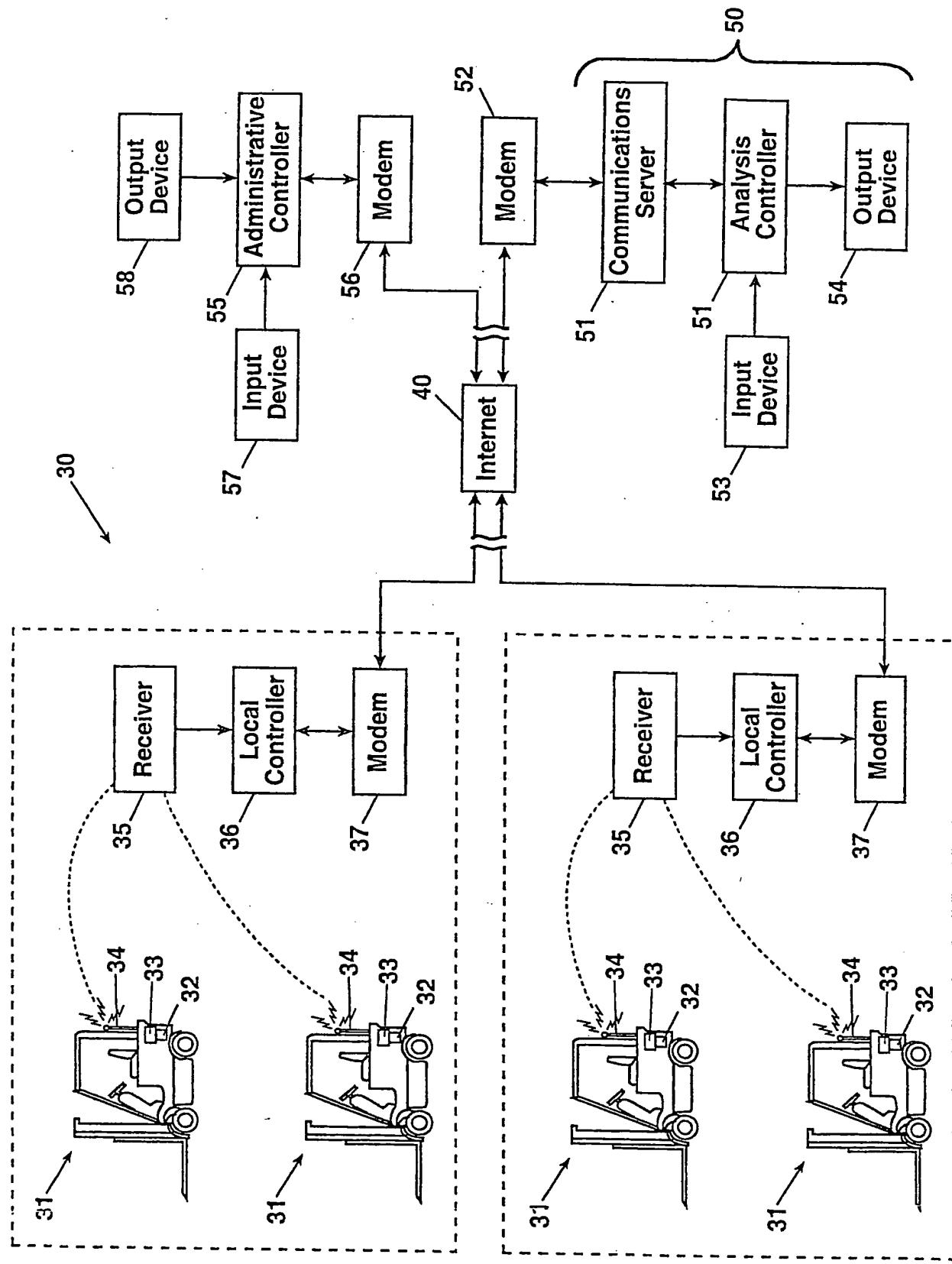


Fig. 2 (PRIOR ART)

Fig. 3



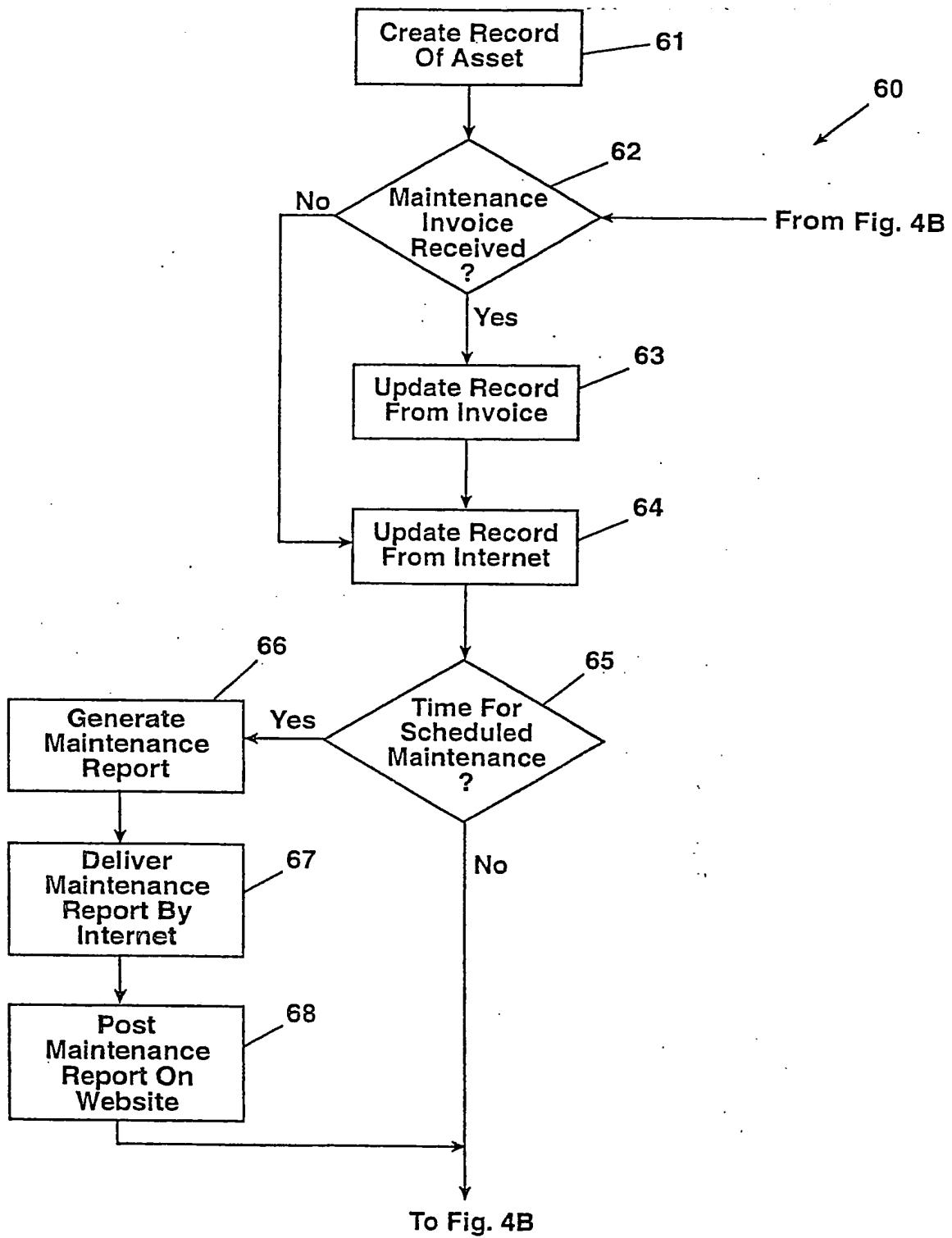


Fig. 4A

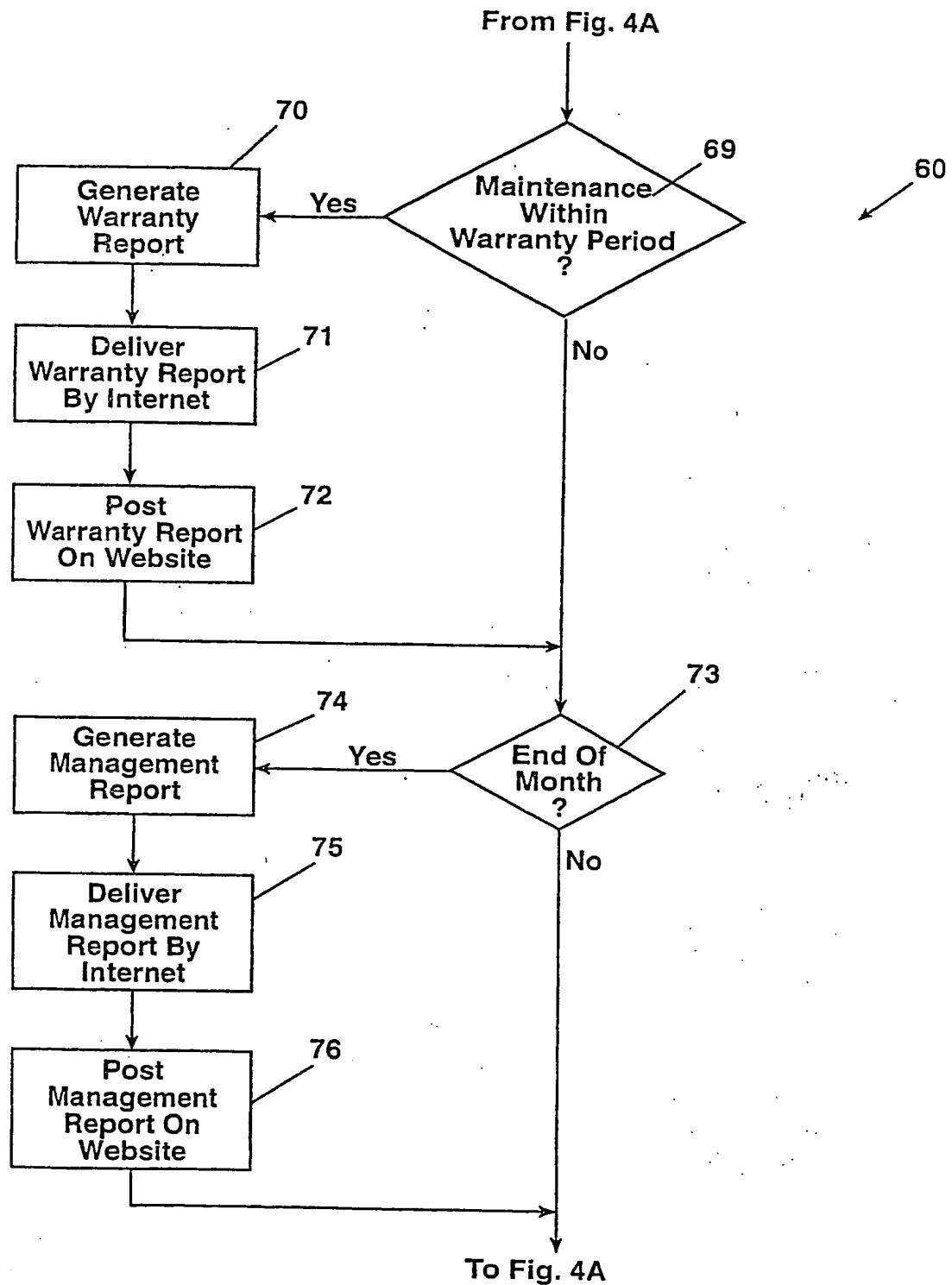


Fig. 4B

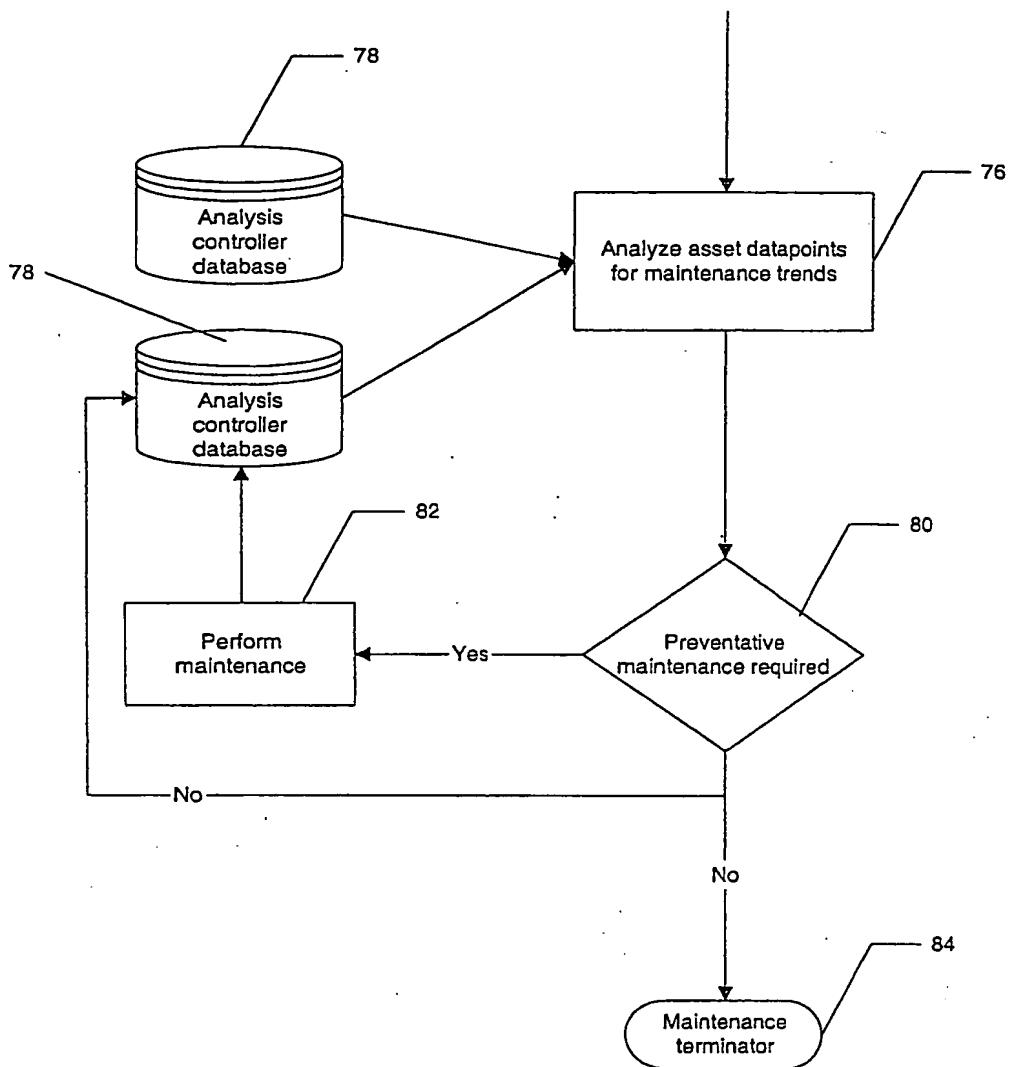


Fig. 4C

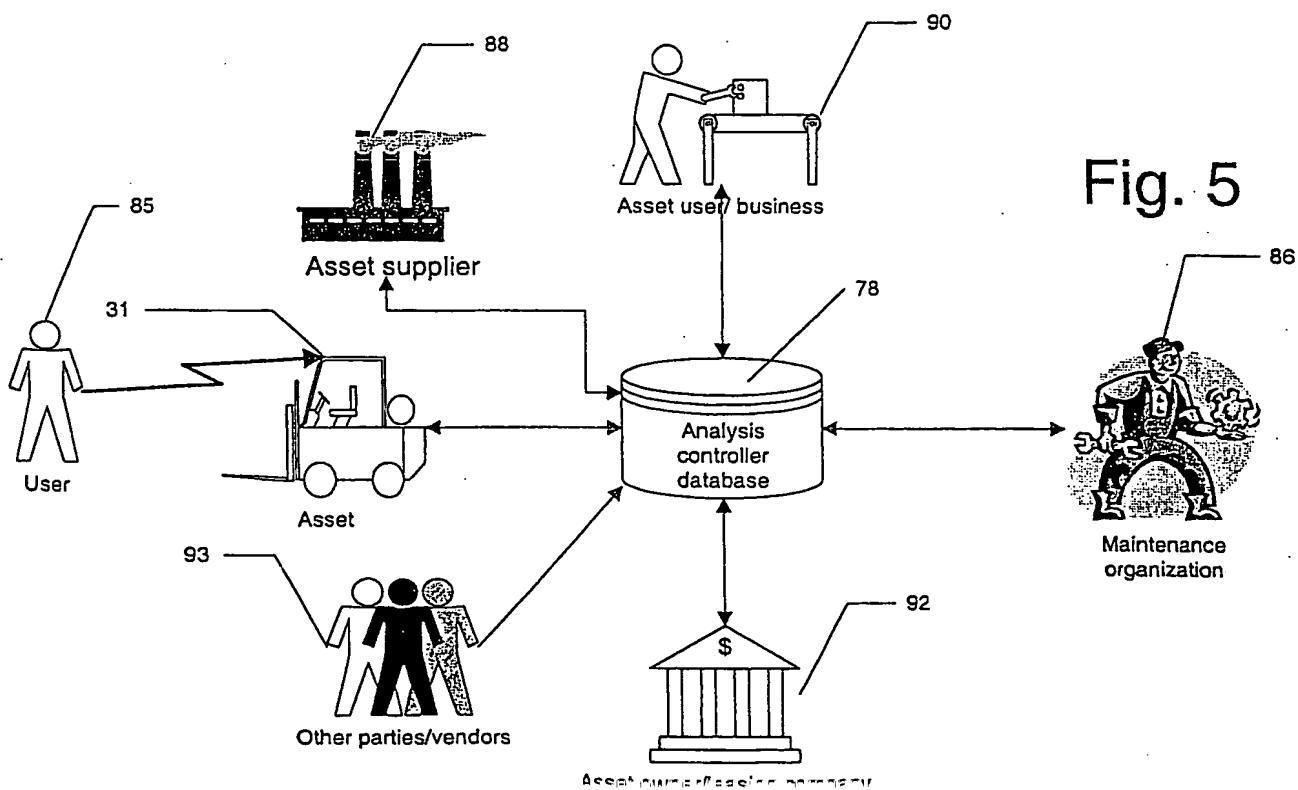


Fig. 5

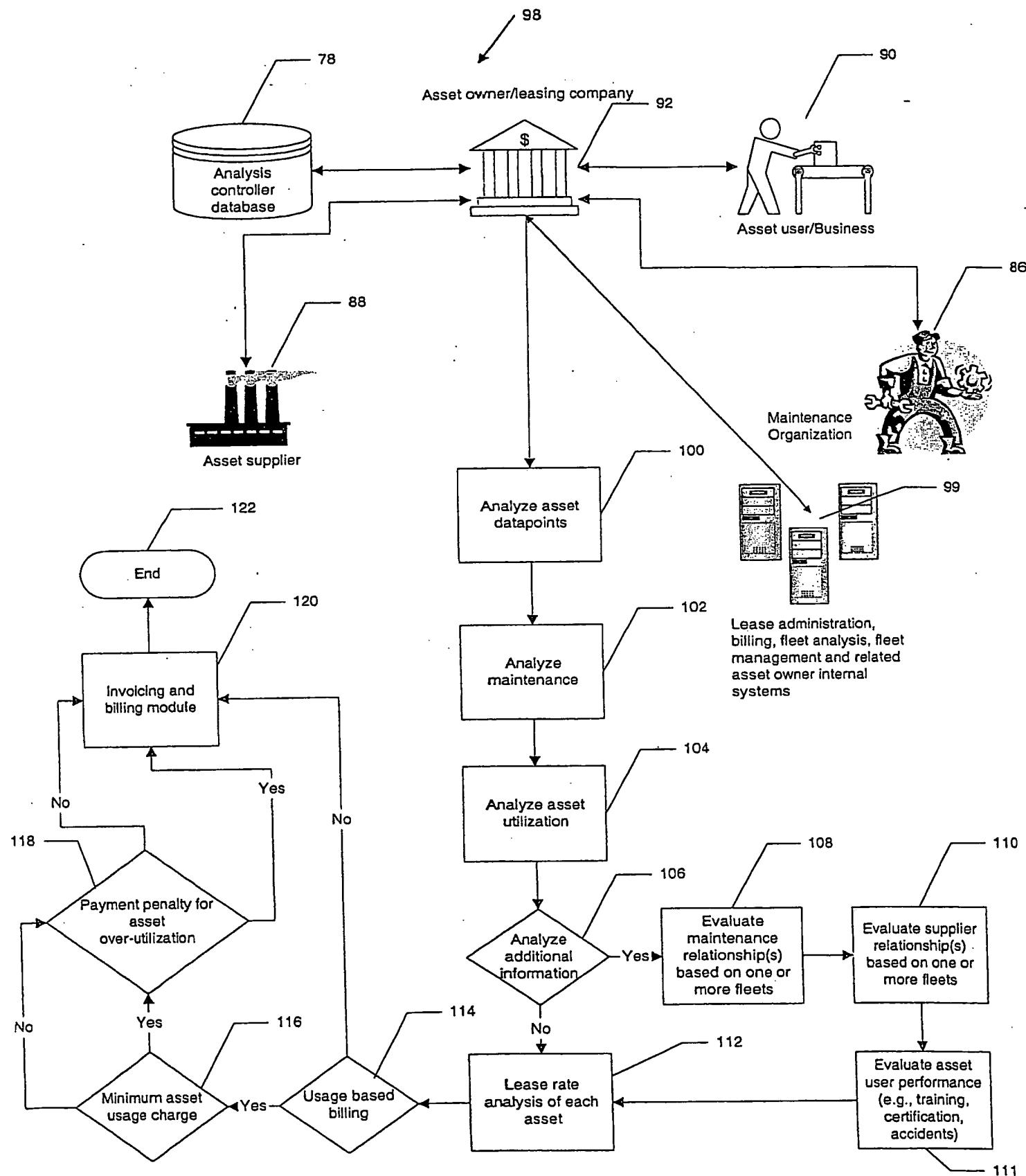
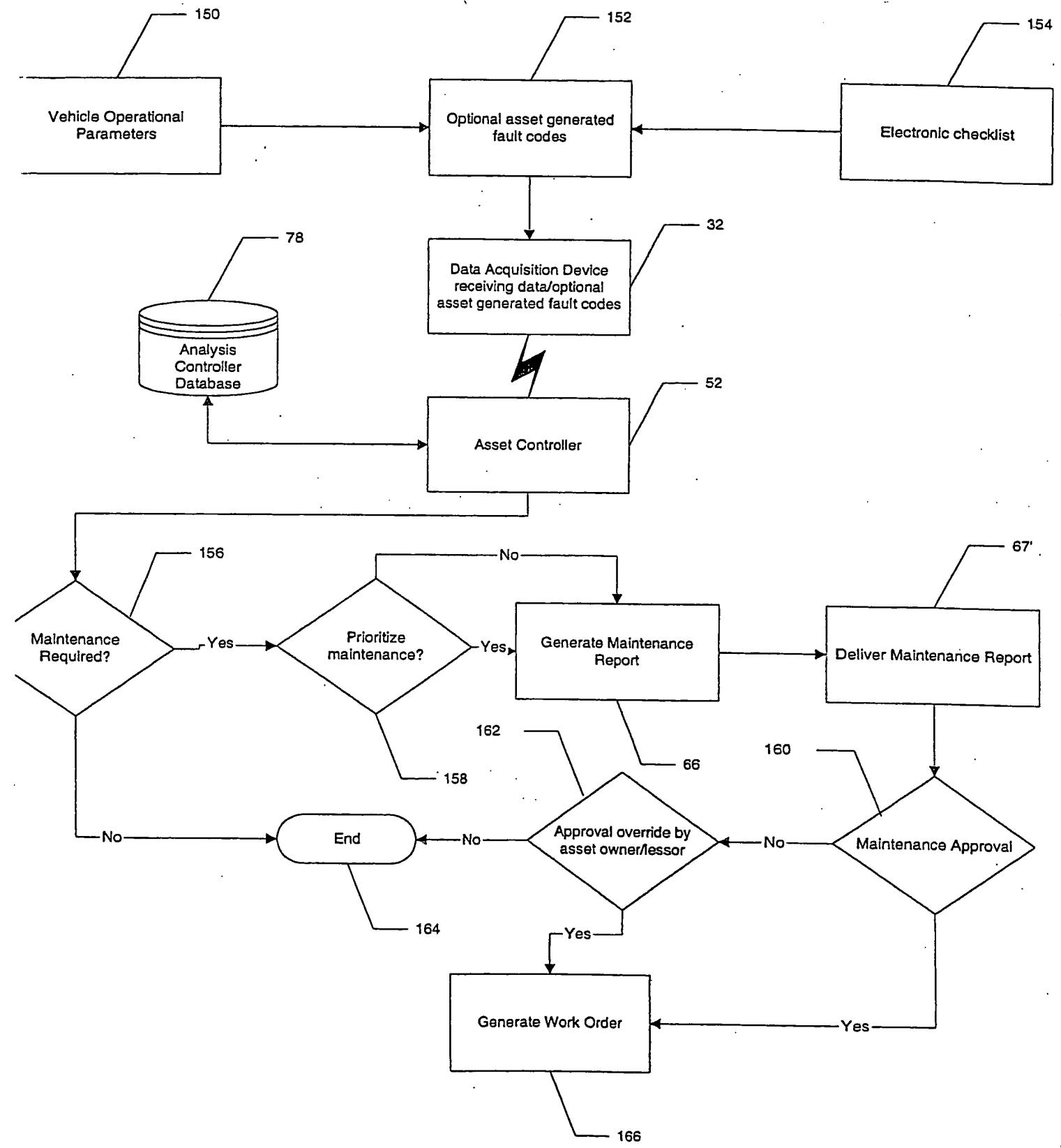


Fig. 6

Fig. 7



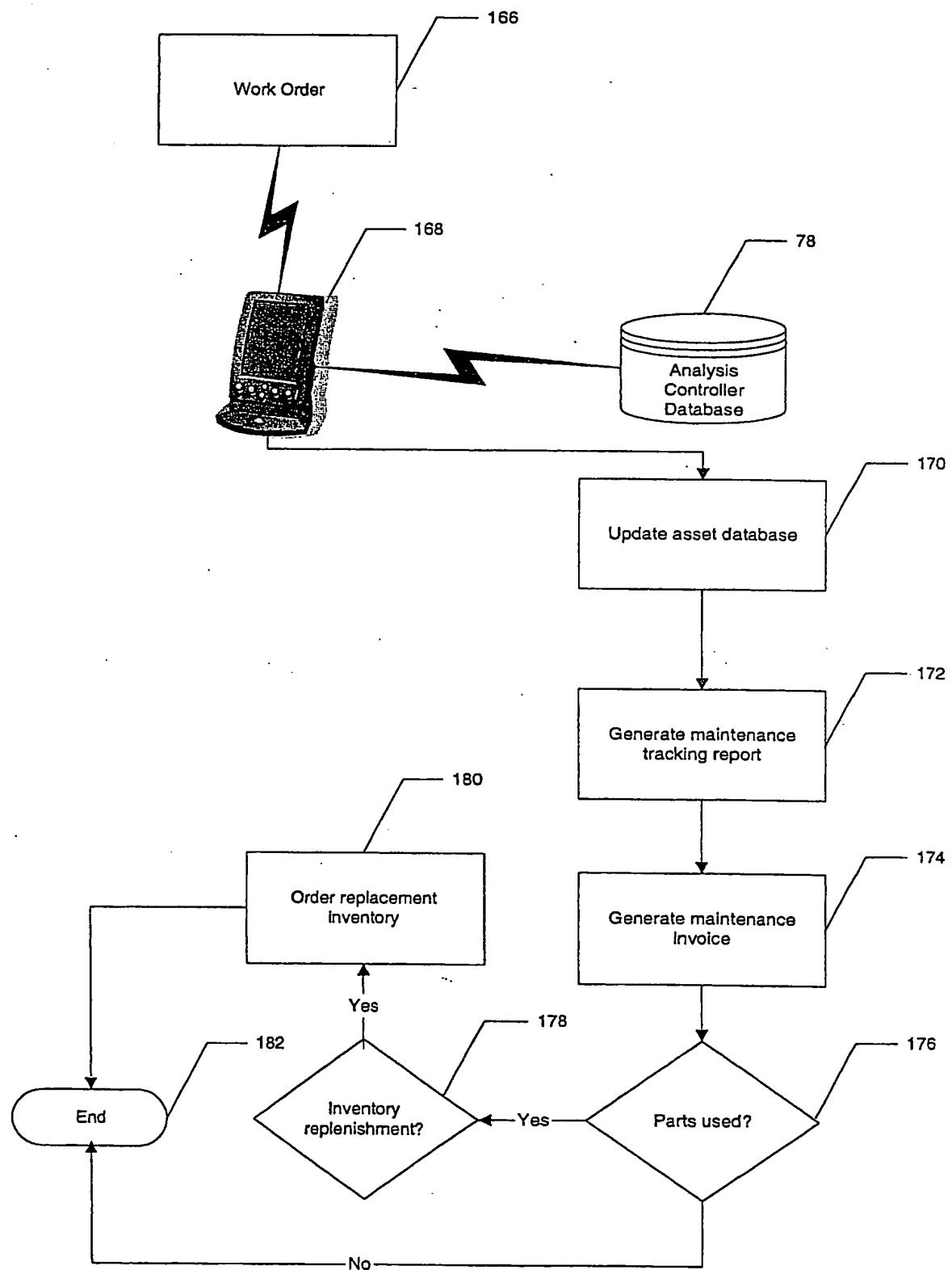


Fig. 8

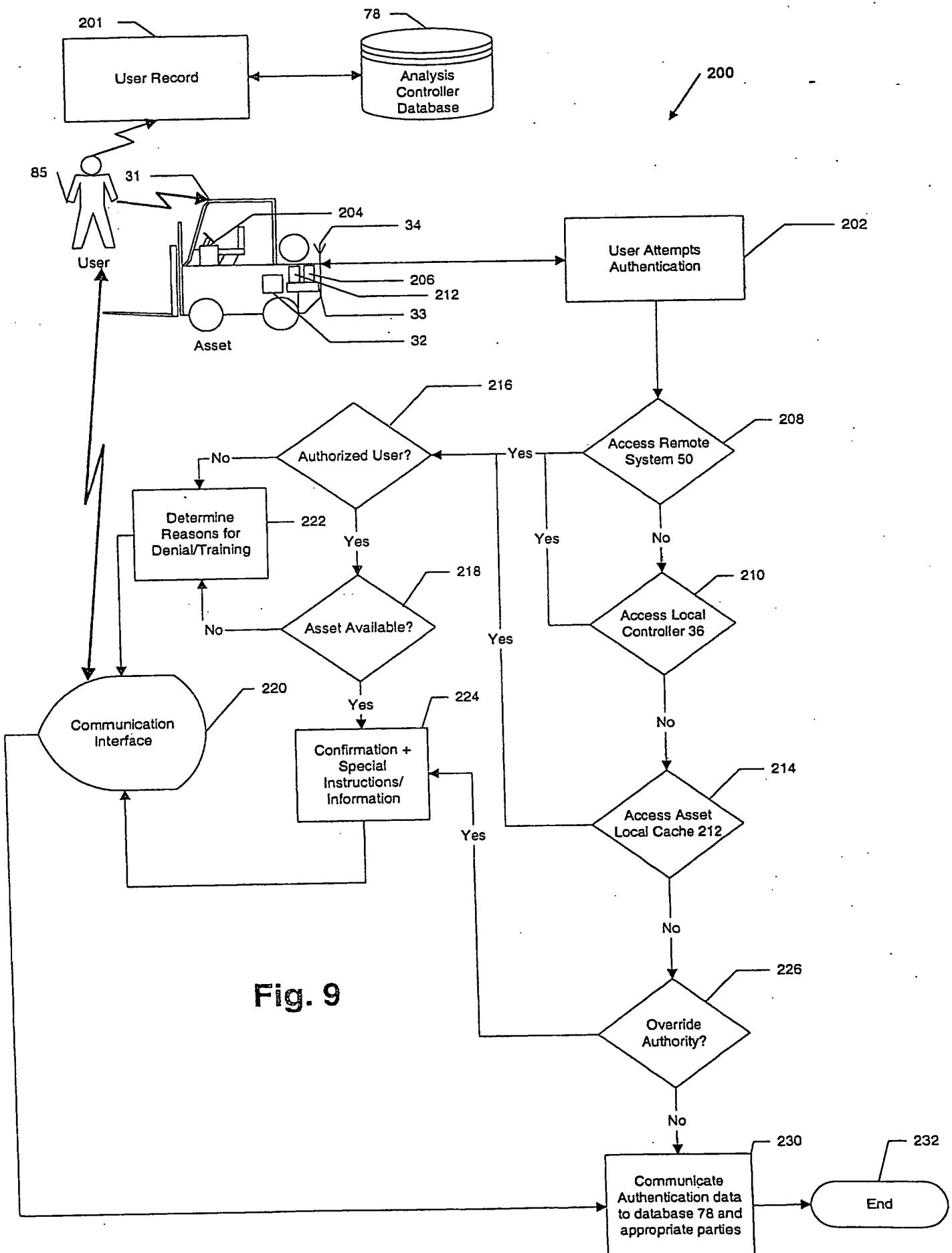
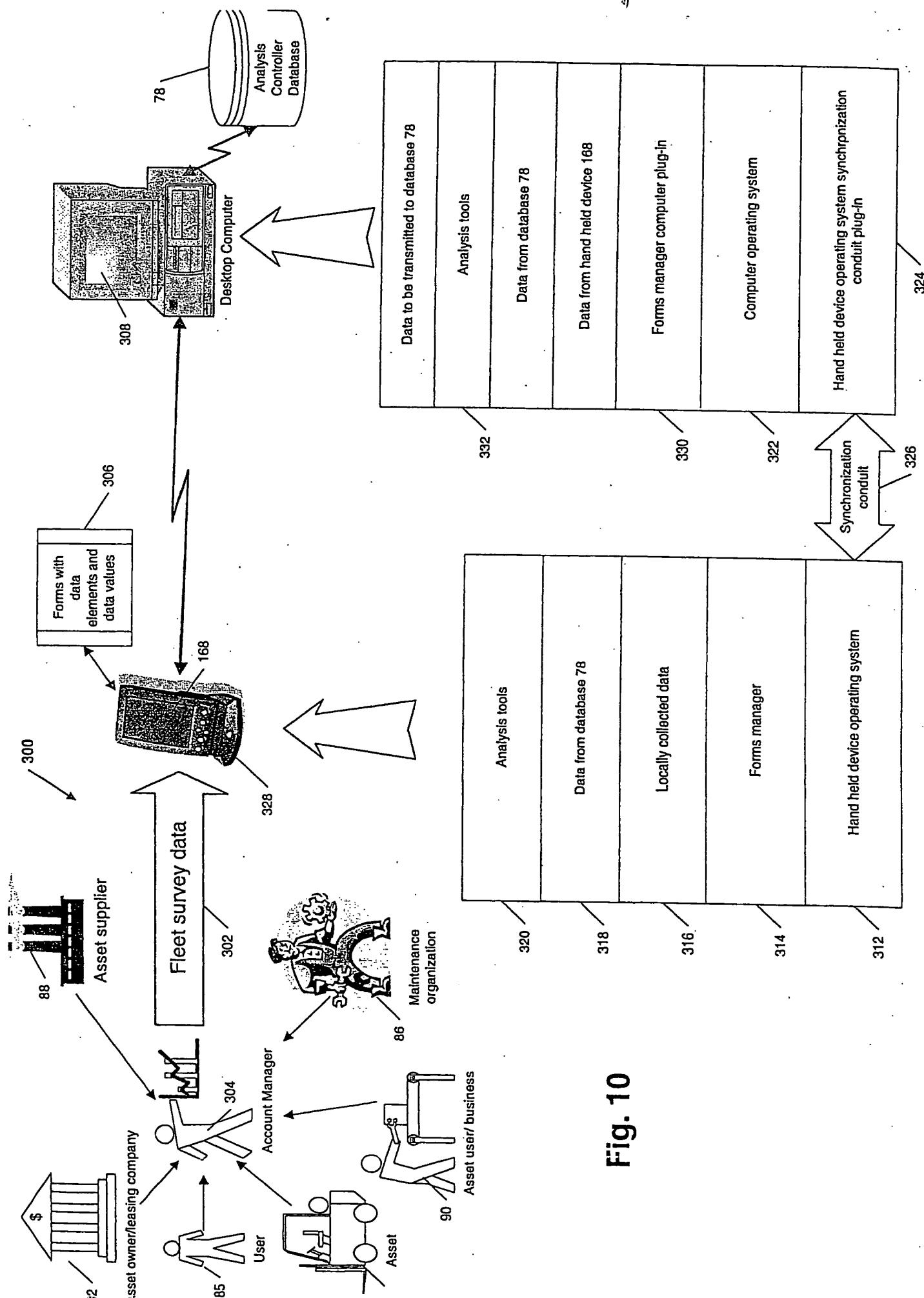


Fig. 9





COMBINED DECLARATION AND POWER OF ATTORNEY

ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,
CONTINUATION, OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is for an original application.

RECEIVED

SEP 04 2002

OFFICE OF PETITIONS

INVENTORSHIP IDENTIFICATION

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am an original, first and joint inventor of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

SYSTEM AND METHOD FOR DISPOSING OF ASSETS

SPECIFICATION IDENTIFICATION

I hereby authorize and request my attorney(s) of record in this application to insert the serial number and filing date of this application in the spaces that follow:

Serial Number: _____, Filing Date: _____.

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56.

POWER OF ATTORNEY

I hereby appoint the following practitioner(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

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I hereby appoint the practitioners associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

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DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURES

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Date _____

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Brent Parent

Inventor's signature _____

Date _____

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Residence 247 Stone Oak Court, Holland, Ohio 43528

R0127229.DOC

ASSIGNMENT
(Joint Inventors)

WHEREAS, We, J. Aaron Bly residing at 2650 Pine Trace Drive, #4, Maumee, Ohio 43537, David T. Spielenner residing at 204 Smith Road, Apt. A, Gibsonburg, Ohio 43431, Aaron Roth residing at 5923 Highlandview Drive, Sylvania, Ohio 43560, and Patrick O'Brien residing at 613 Midfield Drive, Maumee, Ohio 43537, Andrew F. Suhy, Jr. residing at 30 Avenue at Port Imperial #301, West New York, New Jersey 07093, and Brent Parent residing at 247 Stone Oak Court, Holland, Ohio 43528 (hereinafter referred to as Assignors) have invented new and useful improvements in:

SYSTEM AND METHOD FOR DISPOSING OF ASSETS

I hereby authorize and request my attorney(s) of record in this application to insert the serial number and filing date of this application in the spaces that follow:

Serial Number: _____, Filing Date: _____.

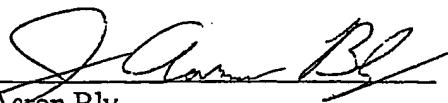
AND WHEREAS, Dana Commercial Credit Corporation (hereinafter referred to as Assignee), of 660 Beaver Creek Circle, Maumee, OH 43537, is desirous of acquiring the entire right, title and interest in and to said invention and said application for Letters Patent of the United States, and in and to any Letters Patent or Patents, United States or foreign, to be obtained therefor and thereon:

NOW, THEREFORE, be it known by all whom it may concern, that for and in consideration of One Dollar (\$1.00) and other good and valuable consideration, the receipt of which is hereby acknowledged, the Assignors have assigned, sold and set over, and by these present assigns, sells and sets over unto the Assignee, its successors, legal representatives and assigns, for the territory of the United States of America and all foreign countries, the entire right, title and interest in and to said invention, said application for Letters Patent, including the right to file foreign patent applications corresponding to said application, and the right to claim the priority date of said United States patent application and any legal equivalents thereof, and any and all Letters Patent or Patents in the United States of America and all foreign countries which may be granted therefor and thereon, and to any and all divisions, continuations, and continuations-in-part of said application, or re-issues or extensions of said Letters Patent or Patents prepared and executed by Assignor on even date herewith, the same to be held and enjoyed by the Assignee, as fully and entirely as the same would have been held by the Assignors had this Assignment and sale not been made.

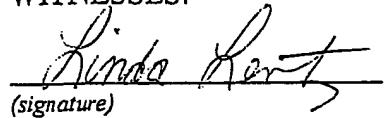
AND the Assignors hereby covenant and agree that the Assignors will at any time upon the request and at the expense of the Assignee execute and deliver any and all papers and do all lawful acts that may be necessary or desirable to perfect the title to said invention and to obtain Letters Patent therefor, and the Assignors hereby authorize and requests the Commissioner of Patents to issue said Letters Patent to the Assignee in accordance with this

Agreement.

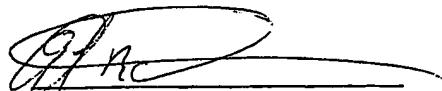
IN TESTIMONY WHEREOF, I hereunto set my hand and affix my seal at
Maymee, in the State of Ohio, this 31 day of October, 2001.
 (city) (state) (date) (month)


 J. Aaron Bly

WITNESSES:

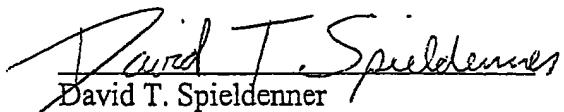

 Linda Lantz
 (signature)

LINDA LENTZ
 (printed name)

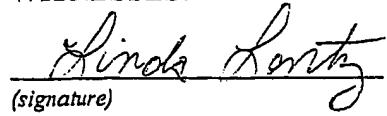

 (signature)

Ellis B. Ramirez
 (printed name)

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Maymee, in the State of Ohio, this 31 day of October, 2001.
 (city) (state) (date) (month)


 David T. Spieldennier

WITNESSES:

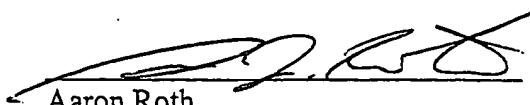

 Linda Lantz
 (signature)

LINDA LENTZ
 (printed name)


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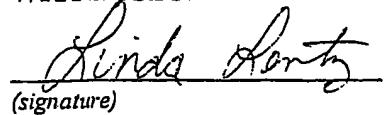
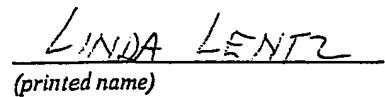
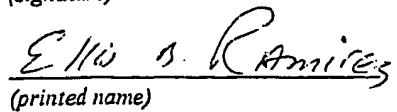
Ellis B. Ramirez
 (printed name)

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my seal at
Mayfield, in the State of Ohio, this 31 day of October, 2001.
(city) (state) (date) (month)

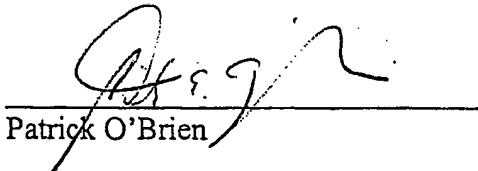


Aaron Roth

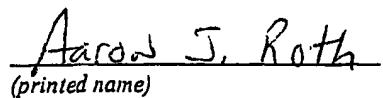
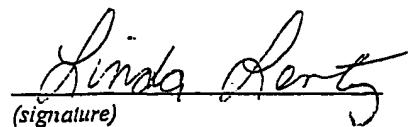
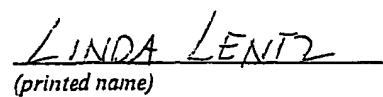
WITNESSES:


(signature)
(printed name)
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(printed name)

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my seal at
Mayfield, in the State of Ohio, this 9 day of November, 2001.
(city) (state) (date) (month)


Patrick O'Brien

WITNESSES:


(signature)
(printed name)
(signature)
(printed name)

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my seal at
_____, in the State of _____, this _____ day of _____, 2001.
(city) (state) (date) (month)

Andrew F. Suhy, Jr.

WITNESSES:

(signature)

(printed name)

(signature)

(printed name)

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my seal at
_____, in the State of _____, this _____ day of _____, 2001.
(city) (state) (date) (month)

Brent Parent

WITNESSES:

(signature)

(printed name)

(signature)

(printed name)

Please address all correspondence and telephone calls and, upon recordation, please return this document to:

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Bloomfield Hills, Michigan 48304
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SYSTEM AND METHOD FOR DISPOSING OF ASSETS

RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Application
5 Serial No. 09/441,289 filed November 16, 1999, U.S.
Provisional Application Serial No. 60/166,042 filed November
17, 1999, and U.S. Application Serial No. 09/503,671 filed
February 14, 2000, and U.S. Application Serial No. 09/714,702
filed November 16, 2000, all applications hereby incorporated
10 by reference in their entirety.

Background of the Invention

1. Technical Field.

[0002] The present invention relates generally to an electronic
15 system and method for use in the field of asset management and
electronic commerce.

2. Description of the Related Art.

[0003] The field of industrial equipment, such as forklifts,
20 includes business entities at several different levels,
including manufacturers, dealers, third-party financiers, and
end-user customers. In one common arrangement, the dealer
maintains an inventory of a wide variety of equipment types
25 for rental to its end-user customers (i.e., the dealer's
"rental fleet"). Some types of equipment in the dealer's
rental fleet, however, are only infrequently needed by the
dealer's end-user customers. Accordingly, such seldomly used
items experience a reduced utilization rate compared to other
30 items in the rental fleet. The dealer tolerates reduced
utilization on the seldomly used items for a number of
reasons, including maintaining customer satisfaction, and,
hopefully, not giving the customer a reason to "shop around"
for a new dealer who may have larger inventory of seldomly

used pieces of equipment. Conventional methods of conducting business, particularly providing rental fleets, have obvious shortcomings, inasmuch as the full economic value of some items in the dealer's rental fleet cannot be realized.

5 [0004] Another common business arrangement involves a third-party financing company that buys pieces of industrial equipment from the manufacturer and then leases the equipment to the end-user customer. The customer then utilizes the industrial equipment (the customer's "fleet") in its business.

10 In some circumstance, the customer actively "manages" the fleet of industrial equipment, attending to repair and maintenance, the acquisition of replacement equipment, and the retirement of old or unproductive equipment from the fleet.

15 In other circumstances, however, the leasing company performs the asset management function. In either set of circumstances, challenges to be overcome by fleet managers include how to effectively and efficiently determine the timing, selection, and acquisition of replacement equipment, and the disposal of equipment being retired from the fleet or

20 coming to an end of the lease term.

[0005] Known approaches to deal with the foregoing challenges fall mostly into the use of manual methods. For example, determining whether to replace a poorly performing piece of equipment has typically been based on limited data relating to the equipment known by an experienced fleet manager.

25 [0006] Another approach known for asset management pertains to passenger vehicle fleets and involves a computer-based, Internet-enabled vehicle selector program. The vehicle selector program provides average values for a plurality of different operating parameters and vehicle types that may be of interest to a fleet manager considering vehicle replacement. These parameters may include average monthly maintenance cost, and average miles per gallon. While the

vehicle selector program provides at least some useful financial and performance information to the fleet manager, such a system fails to address the ultimate question fleet managers encounter: How does a change (i.e., an addition, or a 5 subtraction) in the configuration of my fleet effect its overall performance? The known vehicle selector program simply does not provide information as to how a combined fleet would perform.

[0007] Another challenge, particularly acute for third-party financing companies, involves how to effectively and 10 efficiently dispose of assets whose lease has ended, or will end in the near future. Conventional analysis approaches have been haphazard at best. They have included utilization of well-known auction systems, posting of off-lease equipment on 15 electronic bulletin boards and the like for sale purposes, as well as utilization of consignment networks. One key shortcoming of all these known systems of disposing of end-of-lease assets manifests itself in the failure to fully realize the full, remaining economic value of the asset. One factor 20 contributing to this shortcoming involves the lack of information available to potential purchasers, renters and lessees. Information concerning the condition, treatment, and, particularly, the maintenance history of the asset during its operating life up to the time the asset is being offered 25 for disposal are all important in determining a sales price, but are frequently unavailable. In any event, such information is never convenient to obtain. For example, it is known in the passenger vehicle fleet industry to make some level of maintenance history data on particular vehicle 30 available to the potential purchaser. However, to obtain this data, the potential purchaser must make a telephonic request to the asset's fleet manager, who manually looks up the information, and provides it (e.g., by way of facsimile) to

the potential purchaser if it is even available. Obtaining such information, therefore, involves a significant investment, both in time and effort. The investment is entirely lost if the purchase is not consummated, and is still 5 partially lost even if the asset is finally transferred. The time lag involved in obtaining the information also leads to undesirable inefficiency. For example, a purchaser may have to make a quick decision regarding whether or not to buy a first asset, which would preclude a lengthy investigation of a 10 second asset (e.g., the first asset may be sold by the time the investigation of the second asset has been completed). This is particularly inefficient if the second asset is a better "fit" for the purchaser than the first asset.

[0008] There is therefore a need for a system and method for 15 facilitating transactions, and for managing assets of a fleet, that minimizes or eliminates one or more of the types problems exemplified above.

Summary of the Invention

[0009] In one aspect of the present invention, an electronic 20 system is provided for facilitating transactions, particularly rental transactions. The electronic system provides, in-effect, a "virtual" rental fleet available to a user of the system, such as a dealer. The system includes an asset configuration unit, a market database, a market search module, 25 and a communications interface.

[0010] The configuration unit is responsive to input data provided by a first user of the system for generating a profile of an asset. The asset profile comprises asset specification data and a bid definition. In a preferred 30 embodiment the bid definition outlines parameters associated with a rental transaction of the asset. The market database is configured to store a plurality of asset profiles. The market search module is configured to search the market

database, based on search parameters specified by a second user, and generate an identification of assets. The bid module is configured to allow the second user to select one of the assets on which to bid. The bid module is also adapted to provide rental options to the second user, based on the bid definition for the asset. Finally, the communications interface is configured for facilitating the electronic remote access by the second user of the system.

5 [0011] Through the foregoing, a dealer or the like is provided access to a "virtual" rental fleet of assets, some of which are not owned or controlled by the dealer. The system allows a user, such as a dealer, to satisfy the requirements of the dealer's end-user customer without having to maintain infrequently used items in the dealer's own rental fleet 10 (which experience low utilization rates and thus return on investment.) Additionally, the electronic system also allows a user, such as a dealer, who has its own under-utilized assets 15 to consign such assets for rental by third parties, thereby allowing an increased, effective utilization rate.

20 [0012] In another aspect of the present invention, an electronic system is provided for facilitating transactions, including, for example, assets disposal. The system, according to this aspect of the present invention, provides detailed information concerning an asset including the maintenance history data so 25 that the user, a potential purchaser, rentee or lessee, may evaluate the asset. The system includes a first database, a market search module, and a communications interface.

30 [0013] In a preferred embodiment, the first database is configured to store information associated with a plurality of assets, such as pieces of industrial equipment. The market search module is configured to search the first database, based on search parameters specified by the user in anticipation of at least one of a purchase, rental and lease

transaction. The market search module is also adapted to generate an identification of assets in accordance with the specified search parameters. At least one of the identified assets has a description that includes maintenance history data of the asset. The communications interface is configured to facilitate electronic remote access of the system by the user, which, in one embodiment, occurs over the Internet.

5 [0014] The electronic system, according to this aspect of the present invention, maximizes value extraction by making 10 detailed information concerning the asset readily available to the user. In particular, the maintenance history of the asset constitutes information that may increase the price obtained for the asset. For example, the maintenance history data is 15 particularly important to a dealer class of users of the system who anticipate sub-renting or sub-leasing the asset for a short term, inasmuch as a common commercial practice places the responsibility of maintenance on the dealer, not the end-user customer. Availability of information such as 20 maintenance history data electronically, and immediately, substantially minimizes or eliminates the cost associated with information acquisition.

25 [0015] In a refinement of the proposed asset disposition, a subsystem is disclosed, which compares a subset of all assets within the inventive system with a series of pre-defined conditions to determine if an action needs to be taken with respect to asset disposition. If a pre-defined condition is met, the system provides a ranked hierarchy of options based on the pre-defined condition that has been met. Associated with each option is the cost of invoking it, and the reasons 30 why it is recommended for consideration. The hierarchy of options and the option determination assumptions are optionally reviewed and then presented to the asset user for consideration.

[0016] In another aspect of the present invention, an electronic system for modeling a simulated fleet is provided. The capability to model a simulated or "fantasy" fleet of assets provides the user with an effective and efficient mechanism to 5 perform "what if" analyses. The user can then use the results to evaluate what effect proposed changes to an existing fleet would have on overall fleet performance. The electronic system for modeling a simulated fleet includes a simulated fleet configuration unit, a reporting and analysis module, and 10 a communications interface.

[0017] The simulated fleet configuration unit is provided for allowing a user to add a plurality of assets to the simulated fleet. Each asset is defined as having at least one parameter associated therewith. For example, in one embodiment, the 15 parameter may be a total hourly cost to operate the asset. The reporting and analysis module is configured to generate a report having a composite output value that corresponds to the parameter, and, is characteristic of all of the assets in the simulated fleet. For example, the composite output value may 20 be a composite total hourly cost for all the assets in the simulated fleet. Finally, the communications interface is configured to facilitate electronic remote access of the system by the user. For example, in a preferred embodiment, the communications interface allows access to the system over 25 the Internet. This reduces the time and effort to obtain information. The system, according to this aspect of the present invention, provides a more effective asset management tool than available using conventional systems.

[0018] In a preferred embodiment, some of the assets contained 30 in the simulated fleet correspond to assets already contained in the user's existing fleet. The remainder of the assets in the simulated fleet correspond to new or used assets proposed for acquisition by the user. The report generated by the

reporting and analysis module contains a composite output value representative of all the assets in a simulated fleet, namely, both the existing assets, and the proposed assets to be acquired. The report may be compared to a second report generated based on the performance of the assets in the existing fleet alone. Comparison of the two reports by the user allows accurate evaluation of the impact of the proposed changes.

[0019] Other objects, features, and advantages of the present invention will become apparent to one skilled in the art from the following detailed description and accompanying drawings illustrating features of this invention by way of example, but not by way of limitation.

15 Brief Description of the Drawings

[0020] Figure 1 is a simplified diagrammatic and block diagram view of a fleet management and electronic commerce system in accordance with the present invention;

20 [0021] Figure 2 is a simplified block diagram view illustrating functional modules according to the invention;

[0022] Figure 3 is a simplified diagrammatic view of a screen output of the system of Figure 1, including a link to further fleet information;

[0023] Figure 4 is a simplified diagrammatic view of a screen output of the system of Figure 1, showing detailed fleet information;

30

[0024] Figure 5 is a simplified flowchart diagram showing the steps for a method of adding an asset to a fleet;

[0025] Figure 6 is a simplified diagrammatic view of a screen output of the system of Figure 1, illustrating greater detail of a selected asset, including maintenance history data;

5

[0026] Figure 7 is a simplified flowchart diagram illustrating the steps for a method of consigning an asset for sale, rental or lease;

10 [0027] Figure 8 is a simplified diagrammatic and block diagram view showing, in greater detail, the process for generating asset specification data and a bid definition;

15 [0028] Figure 9 is a simplified diagrammatic view of a screen output of a fleet search module of the present invention;

[0029] Figure 10 is a simplified diagrammatic view of a market search criteria input form;

20 [0030] Figure 11 is a simplified diagrammatic view of a screen output showing an identification of assets resulting from the market search;

25 [0031] Figure 12 is a simplified diagrammatic view of a screen output showing purchase, lease and rental options;

[0032] Figure 13 is a simplified diagrammatic view of a screen output showing assets contained in a simulated or "fantasy" fleet;

[0033] Figure 14 is a simplified diagrammatic view of a screen output illustrating a report, including a composite financial parameter, for a simulated fleet;

5 [0034] Figure 15 is a simplified flowchart diagram illustrating the steps for comparing assets with pre-defined conditions and then providing ranked options based on the condition met with respect to asset disposition; and

10 [0035] Figure 16 is a simplified diagrammatic view of a screen output illustrating a report showing the status of asset disposition based on available options and their consideration.

15

Detailed Description of the Preferred Embodiments

[0036] Referring now to the drawings wherein like reference numerals are used to identify identical components in the various views, Figure 1 is a simplified diagrammatic and block diagram view showing an electronic system 20 for managing, tracking and conducting electronic commerce, with respect to a plurality of assets designated 221, ..., 22n. The assets 221, ..., 22n are illustrated as being a plurality of pieces of movable industrial equipment, such as a plurality of conventional forklifts or similar machinery, used in the manufacture of goods in a typical factory environment. It should be understood, however, that system 20 is configured for operation with a wide variety of assets. System 20 is further configured to manage, and facilitate commercial transactions involving other assets (i.e., those not tracked) that are consigned or otherwise made available on an electronic market established by system 20.

[0037] Before proceeding to a detailed description of system 20 keyed to the drawings, a general overview of the features of the present invention will be set forth.

[0038] Electronic system 20 overcomes a problem identified in the Background, namely, the inability of prior systems to significantly facilitate business transactions that could increase utilization of infrequently rented assets in a user's rental fleet. Electronic system 20 includes functionality that allows users, in-effect, to consign assets on an electronic market in a manner that makes detailed information, such as maintenance history, readily available. Through the foregoing, users of system 20 having under-utilized equipment may use system 20 to "post" such equipment on the electronic market for rental, lease, or the like by other users of the system. Not only does system 20 enable some users to increase utilization of under-utilized assets, other users, (e.g., dealers) who have an occasional need for some equipment (e.g., to provide to their end-user customers), can rent or lease equipment from the market in contemplation of sub-rental or sub-lease, without having to actually own the equipment. Detailed information, such as maintenance history data, allow users to make informed decisions. Equipment selection efficiency is significantly improved since it is commonplace for users such as dealers to be responsible for the maintenance of equipment they sub-rent. Well-maintained and problem free equipment will likely be in the highest demand, and draw the highest lease and rental rates.

[0039] Another shortcoming set forth in the Background involves the failure to realize an assets' full value upon disposal at the end of a lease term. Conventional systems are inefficient and inconvenient for making desired information available to new owners, lessees, and renters prior to their making decisions concerning such transactions. In accordance with

the present invention, electronic system 20, is configured for facilitating transactions by creating an electronic market. In particular, system 20 is configured to allow remotely located users to electronically search the market based on 5 search parameters they specify, and obtain a detailed description of the assets, including the maintenance history data. System 20 also includes a bidding mechanism configured to allow the user to bid on the assets. The contemplated transactions can be closed electronically.

10 [0040] As stated in the Background, one shortcoming of conventional asset management systems involves the absence of an electronic "what if" analysis tool. The present invention overcomes this shortcoming, enabling the creation of a simulated ("fantasy") fleet. A user of system 20 may add a 15 plurality of assets to the simulated fleet, including currently held or controlled assets in an existing fleet, such as assets 221, ..., 22n, as well as new and/or used assets available in a "market" portion of system 20. The simulated fleet analysis tool allows the user to evaluate proposed 20 changes to an existing fleet. The tool may be used to compute parameters of interest that are characteristic of all the assets contained in the simulated fleet, which can then be compared to the same parameters for the user's existing fleet.

25 [0041] Referring now to Figure 1, system 20 is configured for electronic remote access by a plurality of remote users, designated 231, ..., 23n, through remote client computers 241, ..., 24n, over a global computer network, such as Internet 26. Private networks or dial-up connecting may also be used. Inasmuch as system 20 performs a variety of functions, such as 30 tracking and management of assets, as well as facilitating electronic commerce, the users 231, ..., 23n may fall into a plurality of user classes, which are accommodated within system 20.

[0042] With continued reference to Figure 1, remote client computers 241, ..., 24n may be any one of a plurality of well known computer systems, such as, for example, a personal computer (PC) running a Microsoft Windows operating system (e.g., Windows 95, Windows 98, Windows NT Workstation, and Windows 2000), or a Macintosh computer (Apple Computer). When used with Internet 26, remote client computers 241, ..., 24n are preferably configured to include a conventionally, commercially available web browser, such as, for example, 5 Netscape Navigator 4.0 or higher, commercially available from Netscape Communications Corporation, or Microsoft Internet Explorer 4.0 or higher, commercially available from Microsoft Corporation, Redmond, Washington. The browser included on client computers 241, ..., 24n preferably includes the 10 capability of establishing a secure connection through Internet 26, by way of a firewall system 44 with web server 30, for example, using a Secure Sockets Layer (SSL) protocol 15 described below. Of course, other mechanisms for establishing a secure connection, such as the S-HTTP protocol may be used 20 so long as both the client computers 24 and web server 30 are configured to include software compliant with the chosen protocol. Moreover, the present invention recognizes that different client software may be required when using private 25 networks or a dial-up connection.

[0043] System 20 interfaces with a tracking and management system 28, and preferably includes a first computer system, such as a web server 30, a second computer system, such as an application server 32, and a third computer system, such as a database server 34. One or more of the servers may be 30 combined, depending on the size and complexity of system 20. Database server 34 is coupled to a market database 36 and a global asset database 38 comprising a fleet database 40 and a preconfigured asset database 42. In the client-server

architecture described herein, the "server" provides the information to the "clients". Electronic system 20 may further include, in an alternative embodiment, a firewall system 44.

5 [0044] Tracking and management system 28 is configured to automatically gather, analyze, and deliver information relating to the procurement and utilization of assets 221, ..., 22n, so as to maximize productivity and to reduce operating cost and administrative burdens. Each asset may be provided
10 with a data acquisition device for sensing and storing one or more operating characteristics associated with the asset. Such information can be transmitted to a receiver connected to a collection controller contained within system 28 for purposes of storing such information. System 28 may be
15 further configured to automatically update individual records associated with each of the assets with information received, including for example, maintenance history information, and hour-meter readings. System 28 is operatively coupled to electronic system 20, particularly database server 34, as
20 shown in Figure 1. This coupling allows system 20 to be updated with current information regarding the tracked assets 221, ..., 22n. Users 231, ..., 23n may then access and review the status of their fleets, over Internet 26, using system 20 as a gateway. Tracking and management system 28 may be a system
25 as described in co-pending application U.S. Serial No.: 09/441,289, filed 11/16/99 entitled "APPARATUS AND METHOD FOR TRACKING AND MANAGING PHYSICAL ASSETS", hereby incorporated by reference in its entirety.

30 [0045] Web server 30 operates as a communications interface for facilitating electronic remote access of system 20 by users 231, ..., 23n via client computers 241, ..., 24n when using Internet 26. Web server 30 is preferably compatible with the ubiquitous HyperText Transfer Protocol (HTTP 1.1), and

includes the capability of establishing a secure connection with client computers 241, ..., 24n via, for example, the publicly available Secure Sockets Layer (SSL) protocol. Version 3.0 of the SSL protocol is commercially available from 5 Netscape Communications Corporation. Web server 30 may comprise suitable hardware configured to handle anticipated traffic (e.g., requests, responses) therethrough, and may further execute conventional, commercial software, such as Windows NT 4.0 operating system software running Microsoft 10 Internet Information Server (IIS 4.0) software, both commercially available from Microsoft, Redmond, Washington 15 USA.

[0046] Application server 32 is configured for running components of system 20, described functionally below, as well 15 as serving reports. Application server 32 may comprise conventional, commercially available hardware, and include conventional, commercially available software such as Windows NT 4.0 operating system software, Microsoft Transaction Server 2.0 transaction server software, as well as a conventional, 20 commercially available reporting engine software, such as Power Builder or Crystal Reports.

[0047] Database server 34 is configured for executing all database serving within electronic system 20, and may comprise 25 suitably adapted hardware selected, in part, on anticipated traffic and data access response-time standards set for system 20. Database server 34 may include conventional, commercially available software, such as Windows NT 4.0 operating system software, and Microsoft SQL server 7.0 database server software, both from Microsoft, Redmond, Washington USA.

30 [0048] Web server 30, application server 32, and database server 34 define a multi-tiered computing environment configured to achieve and implement the functionality to be described in greater detail hereinafter. It should be understood that

alternate architectures may be employed, achieving the same functionality, yet remain within the spirit and scope of the present invention.

[0049] System 20 organizes asset information into several 5 logical groups. Market database 36, shown diagrammatically in Figure 1, is configured for storing a plurality of asset profiles, associated with a corresponding plurality of assets, destined for disposal on an electronic market. Contemplated transaction types include sale, rental and lease. The asset 10 profile includes two parts: asset specification data and a bid definition. The asset specification data includes a variety of details about the asset, as well as its maintenance history. The bid definition outlines the parameters associated with the above-described commercial transactions 15 contemplated for the asset. Market database 36 is illustrated as a logically separate database, although it should be understood that market database 36, in alternative embodiments, may be implemented together on the same physical hardware as the global asset database 38. Market database 36 20 is configured for rapid retrieval of asset information, as desired to facilitate the electronic commerce functionality of electronic system 20.

[0050] Fleet database 40 is configured to store asset specification data for assets contained in fleets being 25 managed by system 20. As used herein, "fleet" is a logical grouping or association of one or more assets, which may include assets 221 ,..., 22n being tracked and managed by system 28. A "fleet" may be either (i) a current fleet, or (ii) a simulated or "Fantasy" fleet. An existing fleet is a fleet 30 containing assets under the control of a user, for example, through ownership or lease. A "Fantasy" fleet may contain (i) any assets in any of the user's existing fleets ("held assets"), (ii) new or used assets not held or controlled by

the user such as may be available for purchase, rental, or lease from third-parties via the market, or (iii) fictional assets having a predetermined usage, and performance profile, from the preconfigured asset database 42.

5 [0051] Preconfigured asset database 42 includes a plurality of asset specifications for various asset types. The asset specification includes values that may be a composite of a plurality of specific, actual assets of the same or similar type. For example, a model "A" forklift from a particular 10 manufacturer may have an average monthly maintenance cost based on a long history of tracking the maintenance cost for model "A" forklifts. A preconfigured asset brings these composite values when added to a fleet.

15 [0052] Firewall system 44 is disposed between the connecting network such as Internet 26, which is generally considered "insecure", and the secure, private network on which servers 30, 32, and 34 reside and execute. Firewall system 44 may be implemented in software, hardware, or a combination of both. As is known generally, firewall system 44 is configured to 20 intercept messages destined for web server 30, or exiting therefrom, and to examine such messages, and block those that do not meet security criteria. Firewall system 44 enhances the security, and hence the integrity, of the electronic market established by the invention. Firewall system 44 may 25 comprise conventional devices and methodologies known to those of ordinary skill in the art.

30 [0053] Figure 2 is a block diagram view of the functional modules implemented on electronic system 20. Functional modules include a login or authentication module 46, a fleet module 48 comprising a simulated fleet module 50 and a current fleet module 52, a fleet search module 54, a market module 56 comprising a market search module 58 and a bid module 60; a

reporting and analysis module 62, and a bid definition module 64.

[0054] Login 46 provides authentication functions, principally through a user ID/password approach. In one embodiment, 5 electronic system 20 includes several classes of users: a guest class, a member class, and a dealer class. A guest is characterized as having no member privileges, but can view assets available in market database 36, as well as other public areas of electronic system 20. A member has an 10 enhanced set of privileges. A member may create an actual fleet, and/or a simulated fleet, may conduct searches of the assets contained in the members existing and/or simulated fleets, may search market database 36 and bid on selected assets, run reports and conduct analyses, as well as place 15 assets in market database 36 for disposal. A dealer has access to the features available to members, but in addition, has access to a set of dealer tools generally unavailable to members, as discussed further below. Finally, electronic system 20 provides for an administrative class of users having 20 heightened, administrative rights and privileges, for example to perform maintenance or reconfigure system 20.

[0055] Before new users can practically use system 20, they must register. Accordingly, associated with login module 46 is a 25 registration module (not shown) that allows a new user to register, typically as either a member, or a dealer. For registration activities and/or user profile changes, web server 30 and the corresponding client computer 24 communicate via a secure, encrypted connection, such as via the SSL encryption protocol.

30 [0056] Regarding existing users, login module 46 is configured to automatically log the user in upon detection of an auto-login "cookie". A "cookie" is a message that is given to a client (e.g., a web browser on a client computer 241, , 24n)

by a server (e.g., web server 30). Client computer 241 will cache the cookie, and store the cookie in a file on the client computer 241 if the cookie is a so-called "persistent" cookie. A part of the message is a description of the range of URLs (e.g., <http://www.ironrhino.com>) for which that cookie is valid, and a time period for which the cookie will persist. Any future HTTP requests by the client computer that fall within that URL range (e.g., <http://www.ironrhino.com>) and valid time period will include, with the HTTP request, the current value of the cookie to the server. In operation, electronic system 20 is configured to query a user 23 using a client computer 24 to determine whether the user wishes to save the user-login and password. If the user responds "YES", then electronic system 20, particularly web server 30, sends a cookie to the corresponding client computer 24, wherein the cookie is stored in a file. When the user subsequently accesses the URL from which the home page of system 20 are served, the browser portion of client computer 24 determines a match and will send the auto-login cookie, (containing login/password) to electronic system 20 for authentication purposes. Upon successful login, login module 46 directs the user (e.g., member or dealer) to the user's start page (best shown in Figure 3).

[0057] With continued reference to Figure 2, fleet module 48 is configured to allow members and dealers to add their current fleet information into electronic system 20 for reporting, tracking and analyzing by module 62. It should be understood that such activities provide much information regarding the status of the fleet, and upon which important business decisions can be based. Simulated fleet module 50 is configured to allow a user 23 to access, add, view, edit and delete assets in a simulated fleet. According to the invention, the "Fantasy fleet" feature allows accurate and

immediate "what if" analysis, unavailable through the use of conventional systems. Current fleet module 52 allows a member or dealer to access, add, view, edit, or delete assets in one or more existing/actual fleets associated with the registered 5 member or dealer.

[0058] Figure 3 shows a user's "start" page 66 generated by fleet module 48 after a successful login. Start page 66 includes a navigation pane, a search pane 70, a descriptive text pane 72, an advertising/promotions pane 74, an existing 10 fleet information pane 76, and a simulated or "fantasy" fleet information pane 78.

[0059] Navigation pane 68 includes, in the illustrated embodiment, a plurality of user-invoked (e.g., via "clicking" with a mouse or other pointing device) functions or operations 15 that enable efficient navigation through the various modules of electronic system 20. Navigation pane 68 includes a Home button 80, a Search button 82, a "My Fleet" button 84, a "Fleet Builder" button 86, a STORE button 88, a Library button 90, a Reporting button 92, and a FAQ (Frequently Asked 20 Questions) button 94. Wherever the user navigates to within system 20, navigation pane 68 will appear at the top of the screen.

[0060] The "Home" button directs system 20 to take the user back to an initial login/registration page, which is then displayed 25 on the user's client computer 24. Search button 82 invokes fleet search module 54, which is configured to search the user's fleets to identify assets based on user specified search criteria (e.g., make, model, and year of manufacture.). The "MY FLEET" button 84 invokes fleet module 48, taking the 30 user to the user's start page 66. The "FLEET BUILDER" button 86 invokes a fleet builder wizard to lead the user through the steps of creating a new fleet of actual assets, or a simulated fleet. The "STORE" button 88 invokes market module 56,

providing the user with access to conduct searches of market database 36 to identify assets for purchase, rental or lease. Library button 90 invokes a library module (not shown) that allows the user to visit the on-line library of system 20 for 5 access to downloadable documents. Reporting button 92 invokes reporting and analysis module 62 for obtaining reports containing analysis results for fleet assets or market items. FAQ button 94 invokes FAQ module (not shown), allowing the user to access questions and answers of interest to the users 10 of system 20.

[0061] Search pane 70 includes pull down menus for defining search parameters for conducting a search of either market database 36, or fleet database 40. The search is invoked, in an illustrated embodiment, by selecting (i.e., "clicking") on 15 a "Search" button 96.

[0062] The descriptive text pane 72 is configured to display predetermined text to the user, based on user interaction with electronic system 20. For example, descriptive text pane 72 may include information instructing the user as to the 20 organization of start page 66, and the available options, such as creating an actual fleet or a fantasy fleet.

[0063] Advertising/promotions pane 74 is configured to display advertising or promotions that may be available. For example, certain pieces of equipment may be on a "lease special", more 25 details of which may be found in the site "STORE" (i.e., via "clicking" on "STORE" button 88 on the user's start page).

[0064] Current fleet information pane 76 comprises the interface through which a user interacts with electronic system 20 to create an actual or a current fleet, and to edit or delete a 30 fleet. Fleet information pane 76 includes, in the illustrated embodiment, a "Create Fleet" button 98, an Edit button 100, a Delete button 102, a radio button 104, and a link 106. Selecting (i.e., "clicking") on the "Create Fleet" button 98

causes fleet module 48 to create a new fleet record in fleet database 40. In one embodiment, the record includes a fleet name, and a location. Edit button 100, when selected by the user, invokes current fleet module 52, which is configured to 5 allow the user to edit the fleet name and/or location of the fleet selected by radio button 104. Note that in Figure 3, only one existing fleet (i.e., the "Denver Division") is illustrated; however, when two or more existing fleets are displayed, each have a corresponding radio button 104 10 associated therewith, and only one of the radio buttons may be selected at a time (i.e., is darkened). The fleet having a darkened radio button is the "selected" fleet for purposes of Edit button 100, and Delete button 102. Selecting the delete button 102 causes current fleet module 52 to delete the 15 selected fleet from database 40. In the fleet information pane 76, in the illustrated embodiment, each existing fleet under the heading "Fleet Name" is configured to operate as a link to another page generated by system 20, particularly current fleet module 52. This "linked" page provides an 20 identification of the assets contained in the fleet. The portion of the "linked" page that shows the asset identification is illustrated in Figure 4 (portions of the "page" have been omitted for clarity, like the Navigation pane 68, which has was already been shown in Figure 3). 25 [0065] With continued reference to Figure 3, Fantasy Fleet information pane 78 includes a "Create Fantasy Fleet" button 108, an Edit button 110, a Delete button 112, a radio button 114, and a link 116. Pane 78, and buttons 108, 110, 112, 114, and link 116 operate in a substantially identical fashion to 30 pane 76, buttons 98, 100, 102, 104, and link 106, as described above, except that they pertain to the Fantasy Fleets. [0066] Figure 4 shows a screen output current fleet module 52, responsive to a user's selection of link 106 in Figure 3.

Figure 4 includes an identification of the individual assets included in the "Denver Division" fleet. In an illustrated embodiment, the identification includes a listing of the following parameters for each asset: a serial number, a make, 5 a model, a capacity (pounds), an asset type, an application rating, a usage parameter, a utilization parameter (percent), and a cost/hour (U.S. Dollars).

[0067] The view illustrated in Figure 4 includes an "Add Asset" button 118, an "Add Fleet Charge" button 120, an Edit button 10 122, a Delete button 124, a plurality of radio buttons 126, a Move button 128, a pull down menu 130 including entries 1301, 1302, ..., 130n, and a link 132. The "Add Asset" button 118, when selected by the user, causes current fleet module 52 to add assets to the selected fleet. This process will be 15 described in greater detail below. The "Add Fleet Charge" button 120, when selected, causes a charge (i.e., monetary charge) to be applied pro-rata to each of the assets included in the selected fleet. Edit button 122, and Delete button 124, when selected by the user, respectively, cause current 20 fleet module 52 to allow the user to edit, or delete an asset from the selected fleet. Which asset is affected is determined by which radio button 126 is selected. The edit function allows the user to edit the asset specification data associated with the asset. The "Move" button 128, when 25 selected by the user, moves an asset (as selected by the radio button 126), from the current fleet to the fleet chosen by the user from one of the entries 1301, 1302, ..., 130n in pull down menu which are actual fleets as well as to thereby move real, existing assets between existing fleets.

30 [0068] Figure 5 is a simplified flowchart diagram illustrating the steps for a method of adding an asset to a fleet. The method begins in step 134. The "Add Asset" function may be invoked from either simulated fleet module 50 or current fleet

module 52. The description of Figure 5 will be made with reference to module 52, although it should be understood that module 50 could be executing the steps as well.

[0069] In step 136, current fleet module 52 obtains basic asset specification data responsive to input data provided by user 5 23. While the particular types of information contained in the asset specification data will vary depending on the particular asset type involved, in the illustrated embodiment where the asset comprises an industrial piece of equipment, 10 namely a forklift, the asset specification data is divided into four subgroups: "basic", "additional", "usage", and "performance". In one embodiment, the "basic" asset specification data may include an asset type (e.g., a standard forklift), a make/model designation, a serial number, a year 15 of manufacture, a capacity (e.g., in pounds), and commentary text. In a constructed embodiment, "clicking" the "Add Asset" button causes a dialog box to be presented to the user having four tabs labeled "basic", "additional", "usage" and "performance". The user moves from tab to tab, filling out 20 respective forms, comprising input boxes and pull down menus. When complete, the user "clicks" on a "SAVE" link. The method then proceeds to step 138.

[0070] In step 138, module 52 obtains "additional" asset specification data, which in the illustrated embodiment of a 25 forklift may include a mast type (e.g., quad, standard, STD, TSU, etc.), a tire type (e.g., cushion, foam filled, non-marking, pneumatic, polyurethane, etc.), a "fuel type", a mast height, a tilt selection, an attachment description, an asset description, a condition, and an accounting system asset 30 identification (ID) number, and a lease ID number. As will be described below, reporting and analysis module 62 generates reports that include financial parameters, on both a per-asset and a per-fleet basis (e.g., average monthly cost). Part of

the cost analysis derives from how much is paid monthly to lease or rent the asset. This cost information, in one embodiment, is derived from information found in a separate accounting/leasing system (not shown), and is identified and 5 retrieved by electronic system 20 using the accounting system asset ID number, and lease ID number, provided as "additional" asset specification data in step 138. In an alternate embodiment, where the asset being added is not an asset covered under a lease in a leasing system in electronic 10 communication with system 20, further financial-option information will be obtained from the user for the asset being added, which may include a purchase price (including applicable depreciation information so as to enable calculation of a monthly cost amount), a lease/rental amount, 15 a lease-life rental-term, and a residual amount for lease/rent. The method then proceeds to step 140.

[0071] In step 140, current fleet module 52 obtains "usage" asset specification data, which may comprise the following: an acquired-from name (i.e., name), an application rating (e.g., 20 light, medium, heavy), a date in service, an active asset designation (i.e., yes or no), a number of shifts used, an original cost per hour, an original usage, an original utilization, as well as other features. The method then proceeds to step 142.

25 [0072] In step 142, current fleet module 52 obtains "performance" asset specification data comprising an original hour meter reading, a number of warranty months, a number of warranty hours, a date warranted, a date warranty removed, an original equipment cost, a list price, a preventative 30 maintenance (PM) hours specification, and a burden labor rate. It should be appreciated that the original hour meter reading provided to system 20 in step 142 has a date associated therewith. The meter reading and date form a data pair.

Future service events on the asset will generally also include further meter readings, such that the fleet database will have a plurality of date/meter-reading data pairs, each having a different date attached to it, for the life of the asset.

5 [0073] When the user completes the entry of the asset specification data, the user will be prompted to enter maintenance history data for the asset being configured. As shown in decision block 144, current fleet module 52 determines, through a suitable prompt to the user, whether 10 further maintenance history data is available. If the answer is "YES", then the method branches to step 146.

[0074] In step 146, current fleet module 52 obtains the next item of maintenance history data for the asset being configured. Maintenance history data may include the job date, a description of the problem (e.g., work-related, abuse, breakdown, regular maintenance) for which maintenance was required, a diagnosis, a commentary, a description of the actual work performed, the name of the vendor performing the work (if applicable), whether the maintenance source is 20 internal/external, whether covered under warranty, a description of the part replaced, a length of service, and an hour meter reading (usage). Financial parameters for the maintenance items obtained from the user may include: Invoice Number, Invoice Date, Invoice Due Date, Invoice Paid Date, 25 Total Cost, Labor Rate, Parts Tax, Labor Tax, Labor Hours, whether the item is Taxable, Exchange Rate, and Exchange Date. Financial parameter values for maintenance items may be used to determine total maintenance cost, and average maintenance cost for the asset. The method then loops back to decision 30 element 144. If the answer to decision element 144 is "NO", then the method branches to step 148.

[0075] In step 148, the asset specification data, including maintenance history data, for the asset being configured is

stored in fleet database 40. The method then proceeds to step 150, where the "add asset" portion of the current fleet module 52 ends.

[0076] The process for adding an asset to a "Fantasy Fleet", 5 although not shown specifically, is the same as outlined above for adding an asset to a current fleet, except that fleet module 48 invokes simulated fleet module 50, rather than current fleet module 52.

[0077] Figure 6 shows a screen output generated by current fleet 10 module 52 for a configured asset. The configured asset comprises asset specification data 154 including maintenance history data 156. In the example illustrated in the drawing, the user reaches the screen of Figure 6 by "clicking" on link 132 in Figure 4. Through the foregoing, a user wishing basic 15 information (i.e., a simple identification) of the assets in the user's fleet need proceed no further than Figure 4. However, for greater detail, including a description of the asset, the user can "drill down" by clicking on link 132 to reach Figure 6. Screen output 152 further illustrates an "Add 20 Maintenance Item" button 158, an Edit button 160, a Delete button 162, a plurality of radio buttons 164 and links 166, and 167.

[0078] For assets being tracked and managed by way of system 28, 25 maintenance history items, such as those illustrated as "Preventive Maintenance" and "Steering Mechanism", are automatically entered and available to electronic system 20 through an information transfer, from a tracking system 28. For assets not tracked by system 28, such data is input to system 20 through "front-end" entry by the user (e.g., 30 selecting the "Add Maintenance Item" button 158).

[0079] The Edit button 160, and the Delete button 162, when selected by the user, cause current fleet module 52 to allow the user to either edit, or delete, respectively, the

65678-0042 (5672 DCCSP)

maintenance item selected via one of the radio buttons 164. The foregoing availability of asset specification data, including maintenance history data, enhances real time management of assets in a fleet (e.g., provides the ability to 5 identify high maintenance items).

[0080] The user, by selecting or "clicking" on link 166, is provided with even greater detail for a selected maintenance item, for example, the item captioned "Preventive Maintenance". Selecting link 167 causes current fleet module 10 52 to retrieve an image of the selected asset. Other features may be provided in the asset description shown in Figure 6, including links to asset specification information provided by the manufacturer, user manuals, repair manuals, and many other types of information that may be useful concerning the asset.

Virtual Rental Fleet

[0081] Referring now to Figure 7, in accordance with the present invention, electronic system 20 is configured to facilitate transactions where a first user, such as a dealer, can consign assets, such as forklifts, to the electronic market established by system 20 for sale, rental, or lease. This feature allows the first user, such as the dealer, to increase asset utilization by exposure of the asset to a broader audience than just the end-user customers of that dealer.

10 Additionally, by making assets available that a second user/dealer can rent, with a view towards sub-renting to an end-user customer, electronic system 20 in-effect provides a "virtual" rental fleet. The rental fleet is "virtual" because 15 electronic system 20 enables the second user/dealer to provide equipment to his end-user customer that he does not own.

[0082] Significantly, the availability of maintenance history data for an asset allows the second user/dealer to make a better-informed decision before renting the asset. In the 20 rent/sub-rent scenario this is particularly important since the second user/dealer is typically responsible for the ongoing maintenance and service of the asset during the sub-rental term (i.e., the end-user customer typically does not pickup this responsibility during the sub-rental term).

25 [0083] Referring to Figure 7, a method of consigning an asset for sale, rental or lease on an electronic market includes several steps. These method steps will be described briefly as an initial matter, then in greater detail in-turn.

[0084] Step 168 involves generating asset specification data 30 including maintenance history data from input data provided by a first user.

[0085] Step 170 involves generating a bid definition from further input data from the first user.

[0086] Step 172 involves storing the asset specification data and the bid definition together in an asset profile in market 5 database 36.

[0087] Step 174 involves searching, market database 36 based on criteria specified by a second user and displaying the asset profile.

[0088] Step 176 involves receiving a selection of an asset from 10 the second user for placement of a bid.

[0089] Step 178 involves providing, to the second user, one or more of a purchase, rental or lease options, in accordance with the bid definition. Step 178 also includes receiving a bid on the asset from the second user, based on the 15 transaction options.

[0090] Step 180 involves receiving an acceptance of the bid from the first user. Once the bid has been accepted by the first user (i.e., the party "posting" the asset on the electronic market), bid module 60 operates to close the transaction 20 contemplated by the bid.

[0091] Figure 8 provides greater detail of generating step 168 (producing asset specification data) and generating step 170 (producing bid definition). In particular, Figure 8 graphically shows in block form an asset profile 182 comprising asset specification data 154, and a bid definition 25 184. Referring to the upper half of Figure 8, asset specification data 154 includes a plurality of field values, including maintenance history data 156. Maintenance history data 156, in turn, comprises at least a date parameter 186, 30 and an action 188 may be any of the information referred to above regarding the maintenance item. In the illustrated embodiment, generating the asset specification data may be

performed by executing the "add asset" method described and illustrated in connection with Figure 5.

[0092] Bid definition 184 defines the parameters associated with the asset being consigned for sale, rental or lease to the electronic market created by system 20. The bid definition 184 defines the bounds of the sale, rental or lease transaction involving the asset. Bid definition module 64 (best shown in Figure 2) is configured to generate the bid definition 184 as follows. In one embodiment, bid definition module 64, when invoked by the user, prompts the user for a bid date 190, an availability date 192, and information defining the classes of users allowed to bid on the asset 194. The bid date 190 establishes the date when the asset is available for other users to bid on. The availability date 192 defines the date when the asset can be delivered.

[0093] Classes of users 194 include a dealer class 196, and a member class 198. With respect to dealer class 196, a logical variable 200 is associated therewith, and may take either of the values "Y", indicating that dealers are allowed to bid on the asset, or "N", indicating that the dealers are not allowed to bid on the asset. As illustrated, logical variable 200 is a "Y", indicating that dealers may bid on the asset. Likewise, with respect to member class 198, a logical variable 202 is provided, and may also assume one of the values "Y" or "N". In the illustrated embodiment, users who are in the member class may also bid on the asset. It should be understood that other logical arrangements, such as the use of a logical "0" or logical "1" could also be used, being an equivalent thereof.

[0094] Bid definition 184 also includes, for each class of users, an identification of which of a sale, rental, or lease transaction is available to that class of user. As shown in Figure 8, all three of a buy option 204, a lease option 206,

and a rental option 208 are enabled for both classes of users (e.g., members and dealers). This is shown by a logical variable 210, (which are all set to "Y"). For each transaction type available to a user class, respective transaction 5 characteristic data is obtained from the first user. For example, the transaction characteristic data for a sales transaction includes a list sales price, such as shown in column 214, and a minimum sales price that a second user (e.g., another dealer) must submit to define a valid bid, such as shown in column 212. The transaction characteristic data 10 for a rental transaction includes a list rental price for a predetermined period of time (e.g., a month), and a minimum rental price for that predetermined period of time that the second user must submit in order to define a valid bid.

15 Finally, the transaction characteristic data for a lease transaction includes a total lease amount, and a term.

[0095] In a constructed embodiment, the bid definition module 64 executes a bid definition wizard. The information obtained from the first user to populate the fields described above is 20 obtained through a step-by-step process, which leads the user along, allowing the user to click on checkboxes to select the classes of users who will be allowed to bid, as well as what respective transactions will be available to that class of user. In addition, the bid definition wizard, as executed by 25 bid definition module 64, allows direct entry of dates, and pricing, where appropriate.

[0096] Bid definition module 64 is also configured for storing the asset specification data and the bid definition in an asset profile in a market database 36 when all the needed bid 30 definition information has been collected. This is shown in Figure 8 by a double arrowhead line to database 36.

[0097] Having described what bid definition 184 is, and how bid definition module 64 operates to obtain such information, a

description of the user's interaction with system 20 will now be set forth. To promote the greatest amount of flexibility for the user, electronic system 20 includes an asset configuration unit for preparing assets for posting and consignment. The asset configuration unit obtains the asset specification data and bid definition to form the asset profile, and comprises multiple interfaces/modules. These interfaces/modules include a create and define feature of market module 56, a sequence of the add-asset feature of fleet module 48 and the add-to-market feature of fleet search module 54, and the add-to-market feature of fleet search module 54 (for existing assets and shown in Figure 2). These three approaches will be described in detail in-turn.

[0098] First, in a create and define feature, the asset specification data (including maintenance history data), as well as the bid definition are made by the first user directly out of market module 56. That is, when a first user, such as a dealer, wishes to post a piece of equipment on the electronic market, the first user, after logging in, initially selects the "STORE" button 88 (Figure 3) from the user's start page 66, which invokes market module 56. Market module 56, as one of its available functions, would directly allow configuration of an asset (i.e., input of asset specification data including maintenance history data, as well as the bid definition). When completed, the asset is stored in the market database.

[0099] Second, if the user wishes to post an asset on the electronic market, but the asset does not presently "electrically" exist in one of the user's fleets, then the user can follow the "add asset" process described above in connection with Figure 5. Once the asset is created "electrically", the user then "clicks" the "Add to Market" button.

[00100] Third, existing assets may be configured for posting as follows. A user, for example a dealer, who wishes to post the existing asset in market database 36, would invoke the fleet search module 54 by selecting the Search button 82. 5 found on start page 66 (Figure 3). Figure 9 illustrates a search form that allows the user to search the user's fleets to identify assets based on specified search criteria. An identification of assets satisfying the criteria is returned by fleet search module 54. The user then selects the asset to 10 be placed on the market. As shown in Figure 9, this selection is done by selecting one of the radio buttons adjacent the desired asset, and then "clicking" the "Add to Market" button 215. Since the asset specification data for the selected asset is already stored in the fleet database 40, only bid 15 definition 184 need be generated for the asset to prepare it for posting. "Clicking" on the "Add to Market" button 215 invokes the bid definition wizard, described above in connection with Figure 8.

[00101] Through the foregoing functionality, electronic 20 system 20 allows a user, such as a dealer, to consign an asset to an electronic market for rental, lease, and/or sale by a second user, such as another dealer. This functionality enables the first dealer to increase utilization of infrequently used pieces of equipment by making those pieces 25 of equipment available to a larger audience of dealers and end-user customers. In addition, the second dealer realizes an increased virtual inventory of equipment from which to, preferably, rent (with a view towards sub-renting to an end-user customer).

30 [00102] In an alternative use of system 20, a non-dealer user of system 20, for example, an equipment leasing company, may purchase infrequently used equipment, for example, and make such equipment available through market database 36. The

universe of dealers (with the dealers sub-renting the equipment to end-user customers) and end-users may have a sufficiently high aggregate need for such piece of equipment to justify the purchase and ongoing rental to third parties.

5 In this embodiment, the end-user customer need not be aware of the actual ownership of the equipment, and will look to the dealer for service, maintenance and the like.

End-of-Lease Disposal

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[00103] A particular business type of user who may take particular advantage of electronic system 20 is one engaged in the business of financing the capital requirements of other companies. For example, such financing may involve the lease 15 or rental of forklifts 221, ..., 22n to the company who actually uses the forklifts in its business, and who pays a lease or rental fee. This type of user often has a large number of leases that may represent literally thousands of individual assets that are or will periodically be coming off 20 of lease. Since this type of user has no direct use for such assets, such assets must be disposed of in an effective manner. The assignee of the present invention has determined that the information acquired during the tracking and management of the asset while the asset was being leased can 25 be leveraged into a value proposition when such asset comes off of lease and must be disposed of. In particular, the assignee of the present invention has determined that keeping maintenance history data associated with assets on lease becomes a value-added feature when disposing of the asset in a 30 fashion to be described in detail now.

[00104] Figure 10 shows a market-search parameter input form 216 generated by market search module 58 configured to allow a search of market database 36. Assets that have been tracked

and managed by tracking and management system 28 over an operating life (or portion thereof) have associated therewith a substantial amount of valuable information, including maintenance history data. When such assets come off of lease, 5 the particular type of user described above (i.e., lessor) transfers these assets into market database 36. Each asset in market database 36 has an associated asset profile comprising both asset specification data (including maintenance history data) and a bid definition. Accordingly, since these end-of- 10 lease assets already have the asset specification data defined, only a bid definition needs to be created. Completing the bid definition may be done manually for each asset, or may be automated through the use of a knowledgebase developed over time. Once the asset profiles for the end-of- 15 lease assets are stored in market database 36, then the other users of electronic system 20 will be able to electronically search the market database, based on search parameters they specify, in anticipation of a purchase, rental or lease transaction.

20 [00105] Referring to Figure 10, once such a user invokes market search module 58, search parameter input form 216 is displayed. Included in display 216 is a series of radio buttons: a lease radio button 218, a buy radio button 220, a rent radio button 222, and an "All" radio button 224. As 25 illustrated, the lease radio button 218 has been selected; accordingly, all assets in market database 36 that are available for lease, and satisfy the other search parameters, will be identified and returned in an output display, shown in Figure 11. It should be understood that the search results 30 may be further limited based on the other search parameters like the class of user conducting the market search (e.g., whether the user is a "member" or "dealer", and whether a particular asset has been configured to be bid on by a

"member" or "dealer"). Selecting the "All" radio button 224 results in a search that identifies all assets (i.e., not limited to any one transaction type). Figure 10 also shows that a market search may be limited by a lower list price 226, 5 an upper list price 228, as well as a plurality of further parameters, such as asset type, make/model, condition, year of manufacture, and availability date, as also illustrated. Once the user has defined the search, the market search is invoked by "clicking" the Search button 230.

10 [00106] Figure 11 shows a screen output 232 of market search module 58. Output 232 includes an identification 234 of the assets satisfying the search parameters. In the illustrated embodiment, identification 234 includes a date available parameter, an asset description parameter, a make and model 15 parameter, a capacity parameter, a year of manufacture parameter, a usage rating parameter, and a status parameter. The status data in the status parameter column, if any, is indicative of whether or not the asset has been sold. As shown in Figure 11, status data 235 for the "Allegany Mega-8" 20 asset indicates that it has been sold. Importantly, each asset, in an illustrated embodiment, is linked to a respective description, detailed in nature and which includes information beyond that contained in the simple identification. A user can "click" on the "Allegany Mega-8" wording that is 25 underlined, and will be hyper-linked to its detailed description. Although not shown in Figure 11, the detailed description of an asset may be substantially identical to the information illustrated in Figure 6.

[00107] Screen output 232 further includes a Bid button 236, 30 a plurality of radio selection buttons 238, a "New Search" button 240, and an "Add to Fantasy Fleet" button 242 having an associated pull down menu 244. Bid module 60 is configured to allow the user to select one of the assets identified in the

market search for placement of a bid. To place a bid on an asset, the user first selects the asset using the radio buttons 238. Thereafter, the user "clicks" on Bid button 236, which invokes bid module 60. The Move or Add to fantasy fleet button 242 will be described in greater detail below in connection with the simulated fleet feature of the present invention.

[00108] Figure 12 shows a screen output 245 generated by bid module 60. In a constructed embodiment, output 245 includes the detailed description of the asset, similar to Figure 6, but which has been omitted from Figure 12 for clarity. Bid module 60 provides transaction options: a purchase transaction option 246, a lease transaction option 248, and a rental transaction option 250. The desired transaction is selected by the user through the radio buttons. In the illustrated embodiment, a "Buy" transaction has been selected by the user.

[00109] When the selected transaction is a purchase transaction, bid module 60 is configured to prompt the user for a bid price offered for the selected asset, which is entered in input box 252. As used herein, the wording "prompt" merely means to provide a mechanism or means to accept the bid price, and does not suggest or require some active activity, such as a blinking input box, input wizard or the like.

[00110] When the selected transaction is a lease transaction, bid module 60 is further configured to prompt the user to select a lease term, a lease type, and a monthly lease amount offered for the selected asset. As illustrated in exemplary fashion in Figure 12, the lease term may be input through a pull down menu 254, the lease type may be input through pull down menu 256, and the monthly lease amount may be entered (e.g., keyboard) in box 258. In a constructed embodiment, the lease term may be one of a 24-month, 36 month,

48 month, 60 month, and 72 month term. Further, in a constructed embodiment, the lease type may be one of a category 1, category 2, category 3, fixed-ten (10%) percent, fixed-twenty percent (20%), buyout-new, buyout-used, category 5 4, category 5, category 6, and category 7 type leases. Lease types may be totally configurable. Of course, other options may be used or offered to the user, depending on the asset, market conditions, etc. To facilitate the bidding process, bid module 60 further includes a lease calculator tool, which 10 may be invoked by "clicking" on the Lease Calculator button 262. The lease calculator tool allows the user to specify lease term and lease type, and enter a third parameter, either a monthly payment or a total lease amount, and have the lease calculator calculate a fourth parameter, the other one of the 15 lease amount and monthly payment. The calculated amount can be directly transferred to the monthly lease amount box 258.

[00111] When the selected transaction is a rental transaction, bid module 60 is further configured to prompt the user for a monthly rental price offered for the selected 20 asset, which may be entered in box 260. The user may submit the bid by "clicking" on the "Submit Bid" button 264.

[00112] Bid module 60 is further configured to generate a bid history (not shown) for each asset that has been posted in market database 36. The bid history comprises a listing of 25 each bid made by the users of system 20 on a particular asset. The bid history includes a detail of the submitted bid (e.g., by whom, price offered, etc.). Bid module 60 is also configured to allow the user that posts the asset in the market database (e.g., the leasing company), to retrieve the 30 bid history, to review the bids contained in the listing, and finally to accept one of the bids to thereby complete the offered transaction.

[00113] Through the foregoing, accumulated information acquired from the tracking and managing of assets can be leveraged to increase financial return when such assets come off of lease and must be disposed of.

5 [00114] In some cases, it is desirable to have a subsystem 300 that runs on a periodic basis, which compares a subset of all assets 22 within system 20 with a series of pre-defined conditions 302 to determine if an action needs to be taken with respect to asset disposition. The pre-defined conditions 10 include either a time variable or a cost variable. For example, one condition using a time variable involves the natural end of an asset lease - including, for example a set time period such as six (6) months prior to an end of a lease. Thus, the time variable is associated with the passage of 15 time. A second condition using a time variable includes a situation such as when a particular asset has excessive usage compared to its time (e.g., hours) in service. An example condition using a cost variable involves an over usage of an asset, wherein based on such over usage, penalties begin to be 20 invoked. Another example condition using a cost variable results when an analysis shows that the cost of leasing an asset appears to be higher than a threshold level when compared to other asset usage options that are immediately 25 available to the asset user (e.g., a lessee) such as by purchasing more assets at a lower cost or reallocating existing assets between locations. It is also possible to develop pre-defined conditions using a combination of time and cost variables. For example, an excessive usage criteria may involve both a time element and a cost element.

30 [00115] As illustrated in Figure 15, if no pre-defined conditions are met at point 302 subsystem 300 terminates at point 304. Alternatively, if a condition is met, subsystem 300 proposes a hierarchy of options at point 306 as to a

proposed action for the benefit of the asset user such as a lessee. The data for making the various options comes from market database 36, global asset database 38, fleet database 40 or asset database 42. As noted above, these may actually 5 be one or more separate databases. Typically, the information used to determine the pre-defined conditions and available options comes from asset identification data, maintenance history data, and lease term. The identification data includes asset make/model and serial number. Lease term may 10 be determined by an analysis of at least two of three pieces of data, namely, lease start date, lease end date, and the length of time between the lease start and end dates.

[00116] Possible options based on pre-defined conditions include: the leasing of additional assets to reduce the amount 15 of use of a pre-existing asset; a comparison of a cost of leasing an asset with a threshold level representing lower cost alternatives; the leasing of additional assets; asset lease renewal; asset purchase or buyout; asset disposal; asset sale; or asset sale and purchase of replacement assets. 20 Associated with each option is the cost of invoking the option and the reasons why the system, in accordance with its review of each option in accordance with the pre-defined rules, believes that the selected hierarchy of options is preferred. Most often the controlling factor will be total price to the 25 asset user for the collection of assets performing the same or similar function.

[00117] Before suggesting lease renewal, for example, the system preferably reviews a database of historical information about lease considerations involving similar assets and 30 alternatively consults with other lessor representatives to determine a quote for renewing the lease term. If this price is lower than other options, it will be listed first.

[00118] Before suggesting the leasing of additional assets, the system preferably reviews current pricing information and asset availability. If the system determines that the overall cost to the asset user will decrease the most if this option is selected, then it will be listed first

5 [00119] In the case of buyout, subsystem 300 may review any existing contract language between the lessor and lessee concerning a fixed price. If there is no such price, it may then review historical information concerning buyouts 10 involving similar assets potentially taking into account such things as asset condition and usage patterns to make a recommendation.

[00120] Finally, before suggesting lease disposal, subsystem 300 considers the cost, if any, with disposing of an asset 22, 15 so that the information may be provided to the asset user.

[00121] Once subsystem 300 determines the hierarchy of possible options to send to an asset user concerning an asset at point 306, notification is sent to an account manager of the lessor having a relationship with the asset user. The 20 account manager is given a report 308 that includes each asset meeting the pre-defined condition and a link to specific information about the asset including asset description, utilization, maintenance history and costs. If there are a number of assets, the assets may be grouped by asset type, 25 time until lease termination, cost, usage, lessee company, asset location, or any other desired criteria. A group manager, to whom an account manager reports, may see assets associated with each account manager. The group manager can sort assets in any manner available to an account manager, but 30 has the additional capability to sort assets in accordance with each account manager.

[00122] In general, the account manager will review one or more of the proposed options generated by subsystem 302 to confirm his agreement with both the hierarchy and the specifics of each option as shown by point 310.

5 Alternatively, the account manager may just review the present option to confirm his agreement with the specific proposal. In some cases it may be desirable to bypass the account manager to have it sent directly to the asset user. However, in many cases, minor adjustments may be appropriate before the 10 option details are transmitted to the asset user. Depending on the nature of the refinements, however, it may be desirable to refine the pre-defined rules in general or for a particular asset user if the nature of the refinement represents particular preferences of such a user. For example, a 15 particular customer may never wish to buy an asset 22 under any circumstances so an option related to a buyout should never be presented to that customer. Thus, in a preferred embodiment of the invention, the proposed options are manually reviewed, and in the case where modifications are made, the 20 rational for the modifications are incorporated back into subsystem 300. Thus, a rejection of a hierarchy of options generates feedback for selectively modifying the availability of future options by system 300 at either a global or customer level.

25 [00123] Once the option hierarchy is finalized, the options are sent in descending order of expected acceptance, as discussed in more detail below, to an asset user by way of electronic mail, facsimile, regular mail, or even a link available on a web site accessible to the asset user. Two-way 30 electronic communications with simple pre-programmed responses available to the asset user are preferred since no manual updating of subsystem 300 is then required.

[00124] Figure 16 illustrates an example of a report 308 in the form of an interactive screen available to the account manager or group manager with various columns. Typically, report 308 is accessed using a client computer 24 and web server 30, as discussed above. Column 312 shows a listing of various lessee companies. Column 314, which is broken into three sub-columns, relates to end of lease options. The first sub-column gives the months remaining before an option must be selected while the second sub-column gives the actual deadline date. The third sub-column is a hyperlink, which when clicked, gives detail on the various options available and their hierarchy, as well as specific lease related details such as pricing or proposed lease term. The detail can be optionally edited, subject to any internal lessor approval process. Column 316 gives facility information. Broken into two sub-columns, the first sub-column gives city and state information while the detail information associated with asset 22 and its location is accessible by the hyperlink of the second sub-column. Column 318 includes the asset information in sub-column format such as asset make, model and serial number. More complete information including full maintenance history, lease information, and the like is available by way of the detail hyperlink. Finally, column 320 gives the status of various communications sent or received from an asset user. Communication status 320 represents the nature of all communications sent or received back from an asset user and the option currently pending from the hierarchical list of options available for the particular situation. A response by the asset user triggers automatically the next response by subsystem 300 for the particular asset as discussed by way of example below.

[00125] In Figure 16, assets 22 are listed individually by each row, but also sorted by lessee company. In the present

example, assets 22 meeting a pre-defined condition associated with companies LOF and Zen's are activated for review.

5 [00126] It is also possible for a specific lessee to see a similar screen if accessing the information by way of a client computer 24 and web server 30. However, in such a case, the information would be limited to leases associated with the particular lessee organization. It also facilitates follow up between an asset user and a lessor to avoid undesirable delay in determining what to do with an asset.

10 [00127] If an asset user rejects a particular recommendation as shown by a change in communication status, the next best option is then presented to the account manager for review and transmission to an asset user until a decision is made.

15 [00128] In the example of Figure 15, the option of accepting a new lease involving new asset is first recommended to the account manager at point 322. Typically, this is called "New Item" in column 320. If the account manager agrees with the proposed terms including cost and duration, he sends it to the asset user. Column 320 is updated to reflect "New Item Sent".
20 If the asset user accepts it ("Customer Accepts New Lease" in column) at point 324, then a new asset is delivered to the asset user at point 326, the off-leased asset is picked up and moved to storage for re-sale or re-lease to a different party at point 328. Subsystem 300 then forks to point 390, where system 20 is updated with the data related to the assets at point 392 and terminates at point 394.

25 [00129] If the asset user rejects the new lease option ("Customer Declines New Lease" in column 320) at decision point 324, then the subsystem 300 recommends based on the next most-favorable option, in this example that the asset user renews its lease of the asset ("Renew Lease" in column 320), which the account manager reviews in the form of an updated report at point 332. If he agrees with the proposed terms

including cost and duration, then it is sent to the asset user ("Renew Lease Sent" in column 320). If the asset user accepts this option ("Customer Accepts Renewal" in column 320) at decision point 334, then renewal documentation is sent to the asset user at point 336 with subsystem 300 forking to point 390 as above. If the asset user rejects the second option ("Customer Declines Renewal" in column 320), subsystem 300 then suggests to the account manager that there be a buy out of the asset by the asset user ("Buyout"), which is reviewed at point 338. Once again, if the account manager agrees, the option with relevant detail on the terms of the proposed buyout is sent to the asset user ("Buyout Option Sent" in column 320). If the asset user accepts that option ("Customer Accepts Buyout") at decision point 340 and the generated buyout price, then the asset is sold to the asset user as shown by point 342 with the subsystem forking to point 390.

[00130] Finally, if the asset user does not accept any of the prior options at point 340, then subsystem 300 sends out a request to the asset user concerning when the asset should be picked up ("Pickup Timing-Sent" in column 320) at point 344, and the asset is picked up at point 346 at the time and location agreed to at point 344. with subsystem 300 forking to point 390.

[00131] No interaction by the account manager is required once all of the remaining options have been provided. In this example, subsystem 300 determined that the addition of assets 22 while maintaining the existing asset was not a viable option, so it was not presented for consideration.

[00132] While Figure 15 exemplifies one possible course of conduct between a lessor and lessee with respect to a particular asset 22, the actual hierarchy of options will depend on the asset, characteristics of the asset user (e.g., e.g., a local versus a national company) current market

conditions (e.g., asset availability on the open market and pricing), and the nature of the relationship between lessee and lessor (e.g., the existence of any particular preferred arrangement for the benefit of the asset user). Further, even 5 after an asset user agrees to an option, further negotiation as to cost and lease timing may be required. For example, as shown in Figure 16, column 320 shows additional status entries: "New Quote Sent", "New Quote Returned" and "Quote Accepted", reflecting additional level of detail available as 10 part of the operation of subsystem 300.

[00133] In summary, subsystem 300 works as follows. A database is configured and information associated with a plurality of assets 22 is stored in the database. Subsystem 300 analyzes the information in accordance with a set of pre-defined conditions. When a pre-defined condition is met, the subsystem recommends asset disposition using a hierarchy of disposition options, and the conditions and the options are selected to reduce expense and to maximize the return on investment for the asset user. The hierarchy of options are 15 typically manually checked and confirmed, and a rejection of the hierarchy of options generates feedback with the system 20 modifying as appropriate the availability of future options.

Simulated ("Fantasy") Fleet

25 [00134] Conventional asset management systems lack effective tools for conducting "what if" analyses i.e., modeling a simulated fleet containing both actual assets and proposed assets. The invention overcomes the shortcomings inherent in 30 conventional systems by providing an electronic system 20 for modeling a simulated fleet. For example, if two older machines, each with high maintenance costs, are replaced by two newer machines with lower maintenance costs, but with

higher lease costs, what effect would such a change make on the overall performance of the fleet? The Fantasy Fleet simulator of the present invention enables computer-based modeling that assists answering such questions.

5 [00135] As shown in Figure 3, a Fantasy Fleet may be created in the same manner as an actual fleet (a fleet with real assets). A fantasy fleet may be created by "clicking" on a Create button 108, which invokes the simulated fleet module 50, which in turn prompts the user to input a fantasy fleet 10 name, as well as a location. Once the fantasy fleet has been created, assets may then be added.

[00136] To promote the greatest amount of flexibility possible, electronic system 20, to implement the "Fantasy" fleet feature, includes a simulated fleet configuration unit 15 that comprises multiple interfaces/modules for setting up and adding assets to the fantasy fleet. These interfaces/modules include at least one of an add-asset feature of simulated fleet module 50, an add-to fleet feature via the fleet search module 54, an add-to-fleet feature via market search module 20 58, and a step-by-step entry system of the fleet builder module (not shown), accessible via the "Fleet Builder" button on the user's start page 66. Each will be described in turn.

[00137] First, the add-asset feature of simulated fleet module 50 may be used. A user may "click" on link 116 in Figure 3, which causes simulated fleet module 50 to generate a screen output 266 --an asset view-- as shown in Figure 13. The user interface illustrated in Figure 13 operates in substantially the same manner as the user interface illustrated in Figure 4 for assets contained in an existing fleet. For example, the user, by "clicking" on the "Add-Asset" button 268, causes simulated fleet module 50 to present an input data dialog, in accordance with the flowchart of Figure 5, for adding an asset. The user then configures the

asset in the same manner as described above for an existing fleet.

[00138] Second, the add-to-fleet feature of fleet search module 54 may be used. As shown in Figure 9, a user can 5 search his fleets by selecting search button 82 from the user's start page 66 (Figure 3), which invokes fleet search module 54. The search results contain an identification of the assets that are available for selection. Selection may occur, for example, through the use of radio buttons, as shown 10 in Figure 9. The user may then select a destination-simulated fleet through the use of pull down menu 270, and then add the chosen asset to the desired fantasy fleet by "clicking" on Add button 272.

[00139] Third, the add-to-fleet feature of market search 15 module 58 may be used. The further method for adding assets to a fantasy fleet involves conducting a market search, using market search module 56, as illustrated in Figure 10. Then, the user adds assets by selecting the desired destination fantasy fleet through pull down menu 244, and "clicking" on 20 the Add button 242. Through this approach, items available in market database 36 may be added to the fantasy fleet.

[00140] Fourth, a user may use the fleet builder wizard to 25 create a fantasy fleet and configure and add assets. The fleet builder wizard may be invoked by "clicking" on the "Fleet Builder" button 86 on the user's start page 66. This step-by-step entry system leads the user along, prompting for a fleet name, and location, an indication that it is a fantasy fleet, and prompts to add an asset. The add asset feature of the "fleet builder" dialog is substantially the same as the 30 "add asset" feature of the current fleet module 52, described above (e.g., Figure 5).

[00141] Figure 14 shows a report 274 generated by reporting and analysis module 62. In particular, each asset listed in

the report has an associated plurality of parameters, such as average monthly usage hours, total maintenance cost, hourly maintenance cost, total lease cost, total operating cost, total hourly cost, percent utilization, etc. A user can 5 invoke the reporting and analysis module 62 by selecting the Reporting button 92 from the "start" page 66 shown in Figure 3. The user may then select the target fleet (existing or fantasy) for which the report(s) will be generated. A user can evaluate changes made to an existing fleet by generating a 10 report for an existing fleet, configuring a simulated fleet reflecting the proposed changes, and then generating a second report.

[00142] The two reports can be compared and decisions made based on the results of the comparison. In the report shown 15 in Figure 14, the assets enclosed by dashed-line box 276 are part of an existing fleet for which a report (not shown) has already been or will be generated by module 62. The assets shown in dashed-line box 278 are proposed additions to the existing fleet. The combination of the assets in dashed-line 20 box 276, and dashed-line box 278 constitute the simulated or fantasy fleet. One exemplary parameter is total hourly cost 280. Reporting and analysis module 62 is configured to generate report 274 having a composite output 282 that is characteristic of all the assets in the simulated fleet. The 25 composite total hourly cost 282 can then be compared to the corresponding total hourly cost for the existing fleet (in the other report) to make an evaluation of the proposed changes. Another composite output shown in Figure 14 is percent utilization 284. It should be appreciated that some of the 30 composite parameter values are determined by reporting and analyzing module 62 according to an arithmetic sum function, such as the total maintenance cost parameter. Reporting and analyzing module 62 is further configured to determine other

composite parameters, such as hourly maintenance cost, utilization, and total hourly cost, according to an arithmetic average function. The parameters dealing with money amounts (e.g., dollars) required or desirable to make an asset 5 acquisition determination may be characterized as a financial figure of merit. Other parameters, such as utilization percent, may be characterized as a performance figure of merit.

[00143] To the extent that the specific assets included in 10 the simulated fleet have actual usage, performance, utilization, and cost data associated therewith, then such information is used by reporting and analyzing module 62 in computing composite values. However, when the assets are of the type that have no asset-specific data associated 15 therewith, then profiled asset specification data is used in performing the analysis. Additionally, when preconfigured assets from preconfigured database 42 are included in a simulated fleet (or in an actual fleet), then composite data for assets of a similar type are used by module 62 for 20 analysis purposes.

[00144] In accordance with the provisions of the patent statutes, the principle and mode of operation of this invention have been explained and illustrated in several preferred embodiments. However, it must be understood that 25 this invention may be practiced otherwise than as specifically explained and illustrated without departing from its spirit and scope.

CLAIMS

What is claimed is:

- 5 1. An electronic system for facilitating disposition of an asset currently under lease by an asset user, comprising:
 - at least one database configured to store information associated with a plurality of assets;
 - a set of pre-defined conditions related to a recommendation of asset disposition based on an automated analysis of said information within said system, at least one of said conditions being met; and
 - 10 a hierarchy of disposition options generated by said system based on said at least one of said conditions, wherein said conditions and said options are chosen to reduce expense by maximizing return on investment to the asset user.
- 20 2. An electronic system as recited in claim 1, wherein said pre-defined conditions include at least one of a time variable and a cost variable.
- 25 3. An electronic system as recited in claim 2, wherein said time variable comprises a passage of time, said at least one of said conditions being met when an asset approaches the end of a lease term.
4. An electronic system as recited in claim 3, wherein said options include lease renewal; asset buyout; and asset return.

5. An electronic system as recited in claim 3, wherein
said time variable comprises asset usage within a
predetermined period of time, said at least one of said
conditions being met when asset use exceeds a usage criteria
5 based on time in service.

6. An electronic system as recited in claim 5, wherein
said options include the leasing of additional assets to
reduce the amount of use of a pre-existing asset.

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7. An electronic system as recited in claim 2, wherein
said cost variable includes a comparison of a cost of leasing
an asset with a threshold level representing lower cost
alternatives.

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8. An electronic system as recited in claim 7, wherein
said options include the leasing of additional assets.

9. An electronic system as recited in claim 1, wherein
20 said information includes asset identification data,
maintenance history data, and lease term.

10. An electronic system as recited in claim 9, wherein
said identification data comprises an asset make/model and
25 serial number.

11. An electronic system as recited in claim 9, wherein
said lease term includes at least two of a lease start date, a
lease termination date, and a length of time between said
30 lease start date and said lease termination date.

12. An electronic system as recited in claim 1, further comprising a manual check and confirmation of said hierarchy of options, wherein a rejection of said hierarchy generates feedback selectively modifying said availability of future 5 options by said system.

13. An electronic system as recited in claim 1, wherein said options are presented to the asset user for consideration in order of expected acceptance.

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14. An electronic system as recited in claim 1, wherein one of said options is a new lease, wherein upon acceptance of said new lease, a new asset is delivered to the asset user, an off-leased asset is picked up, and said off-leased asset is 15 disposed.

15. An electronic system as recited in claim 1, wherein one of said options is a renewed lease, wherein upon acceptance of said renewed lease renewal documents are 20 executed by the asset user.

16. An electronic system as recited in claim 1, wherein one of said options is an asset buyout, wherein upon acceptance of said asset buyout, the asset is purchased.

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17. An electronic system for facilitating disposition of an asset currently under lease by an asset user, comprising:

at least one database configured to store information associated with a plurality of assets;

5 a set of pre-defined conditions related to a recommendation of asset disposition based on an automated analysis of said information within said system, each of said conditions comprising at least one of a time variable and a cost variable, at least one of said conditions being met;

10 a hierarchy of disposition options generated by said system based on said at least one of said conditions, wherein said conditions and said options are chosen to reduce expense by maximizing return on investment to the asset user; and

15 a manual check and confirmation of said hierarchy of options, wherein a rejection of said hierarchy generates feedback selectively modifying said availability of future options by said system.

18. An electronic system as recited in claim 17, wherein said 20 time variable comprising a passage of time, said at least one of said conditions being met when an asset approaches the end of a lease term or when asset usage exceeds a usage criteria based on time in service; and

25 said cost viable including a comparison of a cost of leasing an asset with a threshold level representing lower cost alternatives.

19. An electronic system as recited in claim 17, said information including asset identification data, maintenance history data, and lease term, wherein said identification data comprises an asset make/model and serial number, and said lease term includes at least two of a lease start date, a lease termination date, and a length of time between said lease start date and said lease termination date.

20. An electronic system as recited in claim 17, wherein said options are presented to the asset user for consideration in order of expected acceptance, and wherein,

10 a first of said options comprises a new lease such that upon acceptance of said new lease, a new asset is delivered to the asset user, an off-leased asset is picked up, and said 15 off-leased asset is disposed,

a second of said options is a renewed lease such that upon acceptance of said renewed lease renewal documents are executed by the asset user, and

20 a third of said options is an asset buyout such that upon acceptance of said asset buyout, the asset is purchased.

21. A method for facilitating disposition of an asset currently under lease an asset user, comprising the steps of:
 configuring at least one database and storing information associated with a plurality of assets;
5 analyzing said information in accordance with a set of pre-defined conditions, each of said conditions comprising at least one of a time variable and a cost variable;
 meeting at least one of said pre-defined conditions;
 recommending asset disposition using a hierarchy of
10 disposition options; and
 selecting said conditions and said options by reducing expense and maximizing return on investment to the asset user.

15 22. A method as recited in claim 21, further comprising the step of:
 instituting a manual check and confirmation of said hierarchy of options; and
 said rejection of said hierarchy generating
20 feedback, selectively modifying said availability of future options by said system.

23. An electronic system as recited in claim 21, including the further step presenting said hierarchy of options to the asset user for consideration in order of expected acceptance, and wherein,

5 a first of said options comprises a new lease such that upon accepting said new lease, delivering a new asset to the asset user and picking up and disposing of an off-leased asset,

10 a second of said options is a renewed lease such that upon accepting said renewed lease renewal, the asset user executing renewal documents, and

a third of said options is an asset buyout such that upon accepting said asset buyout, the asset user purchases the asset.

ABSTRACT OF THE DISCLOSURE

A database is configured and information associated with a plurality of assets is stored in the database. The system 5 automatically analyzes the information in accordance with a set of pre-defined conditions. When a pre-defined condition is met, the subsystem recommends asset disposition using a hierarchy of disposition options, and the conditions and the options are selected to reduce expense and to maximize the 10 return on investment for the asset user. The hierarchy of options are typically manually checked and confirmed, and a rejection of the hierarchy of options generates feedback with the system modifying as appropriate the availability of future options.

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August 22, 2002

ALISA Varela
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Shipment Reference Information: 65678-0042

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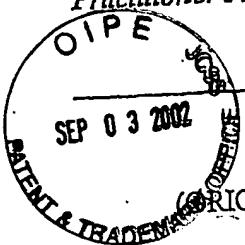
Shipper: RADER FISHMAN GRAUER
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COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,
CONTINUATION, OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is for an original application.

INVENTORSHIP IDENTIFICATION

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am an original, first and joint inventor of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

SYSTEM AND METHOD FOR DISPOSING OF ASSETS

SPECIFICATION IDENTIFICATION

I hereby authorize and request my attorney(s) of record in this application to insert the serial number and filing date of this application in the spaces that follow:

Serial Number: 09/990,911, Filing Date: 11/14/2001.

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56.

POWER OF ATTORNEY

I hereby appoint the following practitioner(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.



Michael B. Stewart

Registration Number 36,018

Robert M. Leonardi

Registration Number 27,815

Phillip A. Rotman II

Registration Number 38,290

I hereby appoint the practitioners associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

SEND CORRESPONDENCE TO

Michael B. Stewart
Rader, Fishman & Grauer PLLC
39533 Woodward Avenue, Suite 140
Bloomfield Hills, MI 48304

Customer Number: 010291

DIRECT TELEPHONE CALLS TO:

Michael B. Stewart
(248) 594-0600

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DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURES

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